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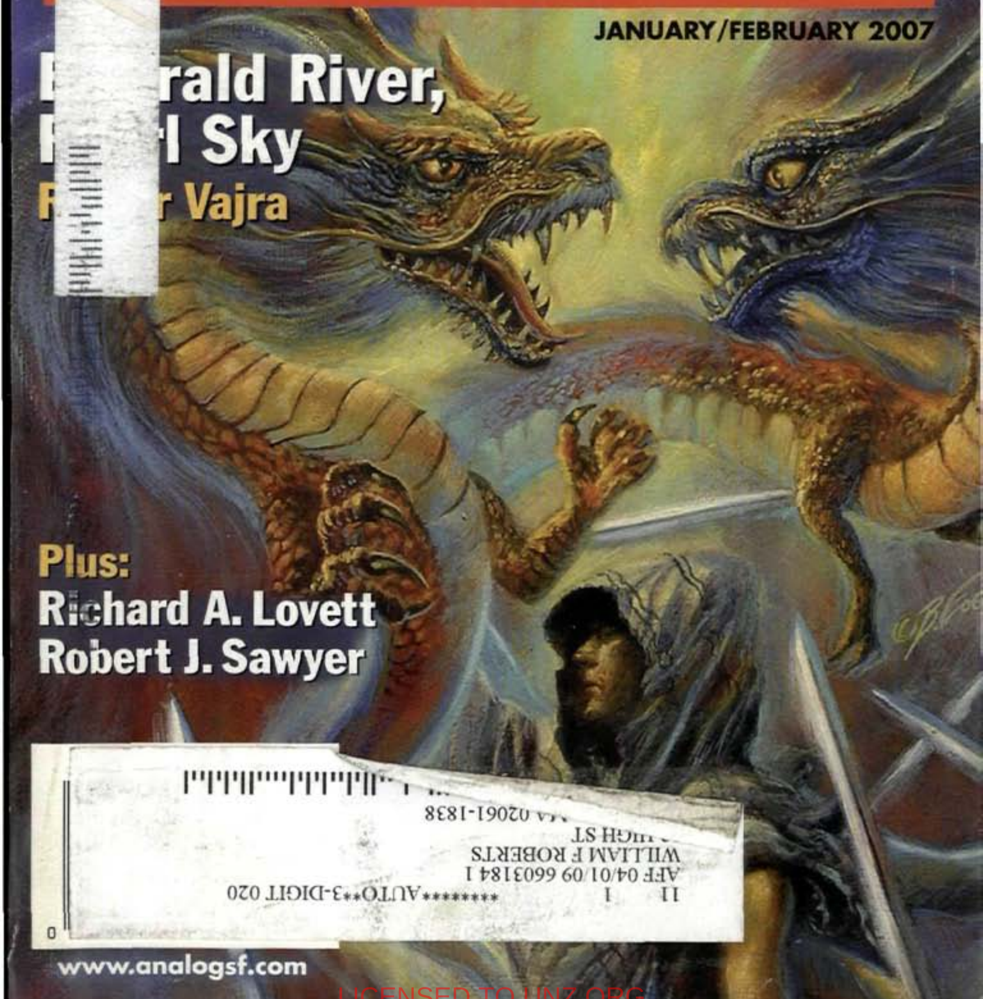

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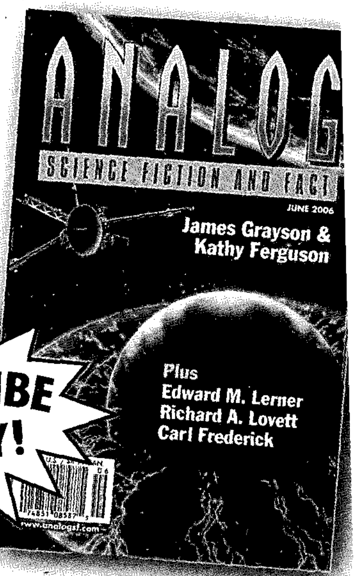
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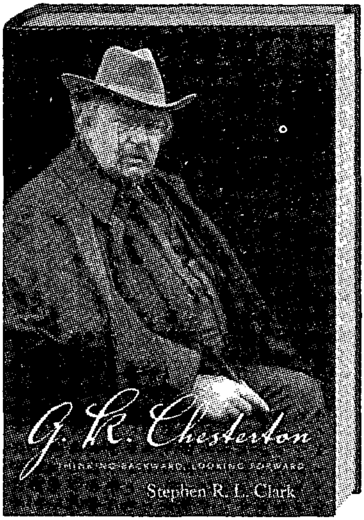

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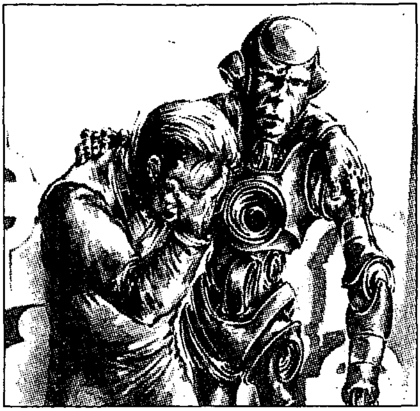

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THE CHEESESTEAK NAZI, THE COLONEL, AND THE FOOD POLICE

Most cultures, I suspect, have proverbs like "The way to a man's heart is through his stomach" or "An army travels on its stomach." As with any other animal, food is one of our most fundamental needs, and our relationships with it drive and/or reflect virtually all aspects of our lives. As Jared Diamond discussed in *Guns, Germs, and Steel*, the whole course of development of "western civilization" in some areas and not others depends crucially on the accidental occurrence of certain plants and animals that lent themselves to domestication in just a few spots. People still fight over cropland and water rights, use "wine and dine" almost as a synonym for wooing the opposite sex (or potential clients), and use particular foods as excuses to flaunt one's own status or sneer at somebody else's. Lobster was considered fit only for livestock and indentured servants when it was plentiful and easy to get; now that it's scarce, the poor can seldom afford it and the rich use it to show off.

Our own current culture has its own odd attitudes toward food and the use thereof. Several of these have been in the news of late, leading me to comment on them collectively as symptoms of some of our more general societal quirks.

Consider, for example, the Philadelphia cheesesteak shop operator who has been accused of discrimination because he posted signs in his window saying "This Is America: When Ordering 'Speak English.'" His motivation was annoyance with the growing number of local residents who can't speak English, which is part of the much larger controversy over the extent to which immigrants should be expected or required to speak English—which is, so far (but to a visibly dwindling extent), the conspicuously predominant language of this country.

Personally, as I've said on numerous occasions, I agree with the cheesesteak guy on the general principle that people who take up residence in a new country—*any* people and *any* country—should consider it both a duty and common sense to learn the prevailing local language as quickly and well as they can. If I moved to Lithuania, I would feel both obliged and eager to learn Lithuanian. I would consider it foolish to deprive myself of the opportunity to communicate fully with my new neighbors, and arrogant to expect them—or their government—to provide services to me in English.

Does this mean that I agree with the cheesesteak vendor's actions? Not particularly; it strikes me as a rather petty and unkind thing for an individual merchant to do. If he really can't understand a customer's orders, there's no problem; he doesn't know what they want so he can't sell it to them. If they can make themselves understood, he can and (in my purely personal opinion) should. (I wonder how he'd feel if somebody plopped him down in Lithuania for a month and made sure that nobody would deal with him except in Lithuanian?) If he's really determined not to sell to them, he can always pretend he doesn't understand.

To his partial credit, he claims he's doing this for their own good (a claim that should usually provoke wariness). One newspaper article says he's never turned a customer away because of the policy, and I seem to recall another that said if customers have trouble ordering in English, he tries to teach them. This is admirable if they *want* him to teach them, but I suspect at least some of them find the process more humiliating than helpful.

Should he be required to do otherwise, as Philadelphia's Commission on Human Relations maintains? I'm not enthusiastic about that, either. There are plenty of cheesesteak salesmen in Philadelphia[1], and customers who want cheesesteak and are unwilling to learn to ask for it in English can find somewhere else to buy it. I'm leery of Big Brother telling people *how* to run their businesses in any more detail than necessary, and it seems to me that ordinary market forces ought to be able to handle this one. Customers who are sufficiently determined to get these particular cheesesteaks can surely make the minimal effort to learn to order them in English; and if this vendor's practices alienate enough customers, he may have to rethink them.

What's often overlooked in the heated debates over linguistic accommodation of immigrants, but clearly pointed out by Charles Krauthammer in an essay in *Time* (June 12, 2006), is that there's a fundamental difference between the current wave of immigration and earlier ones. Past waves included a mixture of people speaking many languages, who (mostly) learned English because they knew they needed it and nobody was going to cater to them in their own languages; they didn't demand that, or if they did, nobody paid much attention to them. The current one has a large preponderance of speakers of *one* language, and there's a sizable and vocal part of our culture so afraid of being accused of "discrimination" that they do seriously advocate providing official services to them in that language.

It's clearly impractical to do that for *every* language spoken by immigrants, and I see no reason to do it for even one. As a taxpayer, I think the government already has its hands way too deep in my pockets, and I don't want to pay for it to provide a huge amount of a service it shouldn't have to provide. And as Krauthammer (raised in Québec) points out, there's a real danger in reducing the incentive for a large wave of speakers of

---

[1] And no, for the record, I am *not* saying that this one is really a Nazi. The title is an allusion to a well-known *Seinfeld* episode, and it's come to a pretty pass when I need to explain that.

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a single language to learn the currently prevailing one: it could be the first step toward dividing us into two cultures, creating a potentially unstable situation like that in Canada (which has occasionally come close to splitting over its bilingualism).

So: I do think all immigrants should learn the prevailing language of their adopted country, if it's lucky enough to have one, and I don't think public money should be spent to reduce their motivation to do so. I don't think a single merchant's withholding food from newcomers (who may be in the early process of learning), or embarrassing them, is a good way to do that. It seems to me quixotic at best and nasty at worst—but I don't think either of those warrants government interference.

Okay, let's look at another example: the group suing a well-known fried chicken chain for using transfats in cooking and trying to force them to stop it. This, and a slightly related debate I'll mention shortly, touches on at least two of our cultural problems: a pathological aversion to accepting personal responsibility or expecting others to do the same, and how to deal with things like the much-publicized obesity epidemic on both medical and economic levels.

At first glance, this seems another simple case of people expecting government intervention to make unwise choices impossible so that no one has to take responsibility for making wise ones. Plenty of information on nutrition is readily available—both effects of particular ingredients and the content of nearly all foods offered for sale—so people should be able to decide for themselves what they want to eat and how much importance they want to place on particular facts. If Transfats Are Bad (as current fashion holds), and a particular restaurant uses a lot of them, you're certainly free to take your business elsewhere (and if enough people do, said restaurant will have to change its ways to compete). Many people try to eat carefully most of the time, but still enjoy an occasional splurge at the "forbidden" place as a special treat. Trying to deprive them of all opportunities for that once-in-a-while indulgence seems like unnecessary overkill, and uncomfortably reminiscent of Prohibition (which didn't work).

But even if somebody wants to live entirely on things that current medical opinion considers unhealthful, that's their choice because it's their body, right?

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My first inclination is to agree, but as often happens, our society has created a tangle of complications. In principle, if you actually believe in the value of individual freedom and responsibility (which not many people do, though many claim to), you pretty much have to agree that people have the right to decide for themselves what to do with their own bodies—*if* they also accept responsibility for the consequences. And that is something that our current culture has aggressively discouraged, to the point of making it practically impossible.

One of the more cogent arguments advanced against making people solely responsible for their own choices about eating (or smoking, or drinking, or . . .) is that excessive or unbalanced eating often leads to a multitude of medical problems. The aforementioned abundance of overweight Americans is only the visible tip of the iceberg; dietary problems also contribute to problems with all parts of the body, notably the cardiovascular system and the digestive system itself. And those cost everybody, because treatment for those ailments is financed mostly by medical insurance. We all pay premiums, and the more the insurance companies have to pay out, the more they have to take in, so the higher the premiums we all pay—whether we ever have to collect much or not. So everybody does have at least an indirect stake in the problem of large numbers of people developing ailments that they could prevent.

But what can we do about it? Many of us are still uncomfortable with the idea of literal "food police" monitoring everything we eat and either telling us what that can be or penalizing us if our choices don't meet their approval. The alternative would be for more people to voluntarily take better care of themselves—but what incentive do they have to do that in our present culture?

Very little, actually, because our society does so many ludicrously counterproductive things. Most people don't actually feel, deep down, any connection between their own health and insurance costs (even their own). They view insurance as a sort of bottomless communal pocket from which they draw whatever they need, so they feel little motivation to keep their needs down. Furthermore, the epidemic of "political correctness" has spawned an automatic tendency to pussyfoot around practically all issues, including this one, by referring to them with gentle euphemisms instead of their real names. My local newspaper recently carried an article headlined, "Should children be called obese?" At present, they aren't, at least by the federal Centers for Disease Control and Prevention, no matter how obese they are. Seriously obese kids are called merely "overweight," while the merely overweight are called "at risk for overweight."

Some pediatricians are trying to change that and adopt the same usage for children as for adults, to get patients and their parents to face squarely a medical problem that they need to try to do something about. But they're afraid of offending somebody. As one doctor quoted in the article says, identifying children as obese might risk "making them [and their families] angry." The article also quotes a young woman who would be affected by the redefinitions as saying the word *obese* "doesn't sound good."

Well, of course it doesn't—and shouldn't. Obesity *isn't* good, not in the sense of being a character flaw, but of being a medical problem that warrants some effort at remedying. Which is more likely to motivate people to make that effort: a word that sounds all warm and fuzzy and neutral, or one that calls a problem a problem? And so what if using such a word makes some patients and their families angry? Maybe, once they get past the initial flare-up, they'll be inspired to see if they *can* do something about it (and I realize that not everyone can).

Probably, though, such an effect

would be minimal unless something is also done to make people feel personally responsible, and I don't see that happening under our present medical financing system. What might do the trick? I'll offer one suggestion that might be a starting point for consideration, though I warn you it is, by contemporary standards, outrageously radical and a long way from politically correct.

The problem is that people want to have freedom while expecting *others* to accept responsibility for the consequences of their actions. What if we removed that link?

What if people had to pay for their own medical care?

Oh, not all of it; I wouldn't be *that* outrageous even in an *Analog* editorial. But not too long ago, insurance was just for the biggies: catastrophic expenses like major surgery. Routine things like check-ups and minor illnesses and injuries were paid for out of the patient's pocket—and that didn't seem nearly as unreasonable then as it does now. What changed? Mainly, as near as I can tell, the combination of the expectation that insurance would cover everything, with the frequent granting of big malpractice awards that drove doctors' malpractice insurance sky-high. That required them to raise rates—and why not, since medical insurance would cover everything?—and that required insurance companies to raise premiums. . . .

It's a classic example of a vicious spiral.

I don't say that this is a finished solution, but I do submit it as a prototype whose consideration might lead to something better: let's limit those malpractice awards and drive all those costs back down to where most people *can* afford to pay for their routine medical needs and it's harder to get help with things that seem excessive but less than catastrophic. When it sinks in that that has happened, maybe more of them will see more reason to do what they can to keep those costs down—because maybe they *won't* be bailed out if they don't.

I realize this will sound harsh to some, but bear in mind that evolution got us where we are today. Our present culture gives it almost no freedom to continue operating, and our present practices encourage the proliferation of both flabby bodies and sloppy minds. Neither of those is good for our future, either collectively or as individuals.

Maybe we should try for something better—and giving evolution at least a *little* chance just may be part of it. ■

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—Let us go then, you and I, on a modest journey of a few paltry miles and a mere thousand years. Relax and allow those who watch over us to instigate and regulate your experience. We begin . . . *now.*

Are you still with me? Good! This winding footpath before us is named Old God Trail. Immerse yourself in every offered sensation to make this reality your own. Observe if you will, how those richly blossomed apple trees to the west stipple the path with shadows steady as granite. Concentrate! Do you notice how well the murmuring of rainbow parrots harmonizes with the droning bees and also that faint melody?

Listen as the melody swells. Can you hear footsteps crunching on the oystershell paving? Ah! Here he is: Vincas Magus, a man wrinkled enough to be an old god's grandfather, tottering along, aided by that staff of walnut. Despite his twisted left leg and the bulging traveling bag hanging from his shoulder, you must admit he makes steady progress, constantly humming within his silver beard. We have only to join him and the lesson will soon unfold. . . .

When Vincas reached Emerald River, he stopped and his humming died. The low-lying fog wasn't thick enough to hide a surprise. The dilapidated old bridge was gone, replaced by a Kyoto-style teak span with a far higher arch. Extending his staff, he poked the first lacquered plank, carved like the others for traction on the sharp incline. Between planks, thin slats protruded to act as a ladder higher up.

"Even last year," he muttered, "I could've danced across. Now I wouldn't dare crawl." He shrugged, backed up several yards to where the ground was less rocky, dropped to a modified lotus posture, and closed his eyes. For a long moment he sat still, breathing slowly and evenly, perceptions turned inward.

Yes? whispered a thin, dry-ice-cold voice seemingly from inside his chest.

Why do you disturb me?

"I've come to a river and cannot cross."

Then find you a bridge.

"A bridge lies before us, Panx, but the way is too steep."

You are aged and weak, magician. What do you offer?

It's come to *this*? Vincas thought, struggling to remain calm; these days he needed a firm grip on tranquility simply to maintain contact with the micro-imp. "I'll grant you freedom from any requests of mine for two days if you do my bidding without complaint."

You consider that *freedom? What else do you offer?*

"A chance for reconciliation. Have you forgotten those decades when we worked together? As a team? Wasn't that better than this . . . estrangement?"

Ah. You desire to reduce me to my former servitude. Your heart shouts between your words; even an earless imp can hear it. You have no superior inducements?

"This is no good," the magician sighed. "We are reduced to hagglers. I regret your misery, Panx, and would free you if I could. But are we not part of each other?"

You surprise me! Your intent tastes sincere. Very well, your request is granted. Trouble me not for a brace of days.

Disturbing as the conversation had been, now that the worst was over, Vincas's curiosity stirred. How would the imp handle the problem? Would Vincas find himself suddenly leaping to the far bank? Or swimming easily against the current? Or would his bad leg simply regain enough vitality to master the bridge? That last, he doubted. Expediency for micro-imps, given their inhuman perspective and miserly attitude toward expending muscular energy, usually assumed some baroque form. He opened his eyes and waited.

Nothing happened save two rainbow parrots flew by and a large tortoise with remarkably long legs for a chelonian came plodding up the riverbank to settle down in a shallow depression near the Trail. A minute later, a matching tortoise joined the first. When Vincas saw the way they lined up, he smiled and pushed himself upright with his cane. With some effort he was soon standing on the reptiles, a foot on each shell, holding his stick horizontally as a balancing aid.

Bears and coyotes and raccoons, he thought, are best kept under control. Cats, dogs, and birds make better pets under similar control. And, of course, lizards and flies have any number of uses. But why would the Ancients have grown command circuits in *turtles?*

Slowly, the animals extended their legs and Vincas began wishing he'd figured a way to ride while seated; the ground seemed improbably distant. But his porters climbed from the depression in perfect unison and with reassuring smoothness. Bearing the wizard with ease and adjusting leg-length to keep their shells reasonably level, they crossed the bridge with the unhurried determination of their kind.

On the far side, a relieved magician dismounted carefully, patted the animals on their heads and proceeded onward briskly compared with the pace of his former steeds. Emerald River paralleled his path at the moment, but he knew it would soon loop west for many miles only to rejoin him as he neared his destination.

The trail, here, was a long straight stretch. After ten minutes of his best hobbling, he noticed a figure far ahead bounding toward him at great speed, clearly a magician whose micro-imp was particularly cooperative. Even from this distance, he or she seemed to radiate vitality and humor. From this and occasional scarlet flashes from the wizard's garb, Vincas guessed it was the baja-mage Kirstunu long before they were close enough to shout a greeting.

"Why do you travel south?" Vincas asked when the two were finally face to face. "The Zun-Loo festival beckons to our north and the Contest this year should be a treat. After my hiatus last fall, I intend to reenter the fray."

The tall red-haired fellow, whose narrow face had something of the curve and sharpness of an axe blade, released his leaping lizards and put out his arms to embrace the old man. Kirstunu's traveling cape fell back to reveal the brilliant red tunic of a lesser mage. Meanwhile, the lizards kept themselves upright with small oscillations, yellow eyes fixed on their master.

"Then sorry I shall be to miss the Contest," said the younger man. "You and Glin Tan, at least, never disappoint. As it happens, I come from Zun-Loo. Lama Go," he admitted with a wink, "took exception to a small prank of mine and has banned me from this year's event."

"Oh so. Your little jokes are so seldom appreciated, I wonder that you continue them. Was your amusement worth the penalty?"

Kirstunu's lips tightened as if trying to repress a grin. "Perhaps not. Three days hence, I will lack the pleasure of watching you win both Glin Tan's glower and the Torus. But if only you had seen our noble lama shooing away all those parrots so eager to feed him worms! In the end, he was forced to annul every personal spell to rid himself of mine. What adds that touch of rue to your smile?"

Vincas chuckled. "The mention of worms, my friend. At my age, I may presently suffer excess acquaintance with them."

"You raise a matter of some interest. Forgive me, I could not help but notice the deepening of your wrinkles and how you limp as if crippled. May I ask why without causing offense?"

"Of course. But you, if I may say so, appear as vibrant and young as ever! In truth, my imp has become obstinate over the last few seasons and will no longer assist me to overcome the defects of my body. Thus I amble when once I ran, and my magic is feeble here in the wilds."

Kirstunu scratched his goatee and lines appeared between his fox-red brows. "But your *jin* remains intact?"

Vincas pulled back one sleeve to display the webbing faintly visible beneath the wrinkled skin of his forearm. "It appears healthy from what can be seen. I will judge its condition by how much strength returns when I approach Zun-Loo's empower station."

The baja-mage spread his hands. "If then your capacities soar, why not reside permanently within range of some empower plant, say that of Westmorland or Plest or Zun-Loo itself? With mighty Pagman enriching the Zun-Loo ether, you would only need your imp's goodwill for high-level competitions."

Mixed joy and wistfulness complicated Vincas's expression. "I can explain in three compound words, Kirstunu: grandchildren, great-grandchildren, and great-great-grandchildren, none of whom follow in my footsteps. I love them all beyond measure yet my offspring do not domicile themselves for the convenience of senile magicians."

"So you are stuck with an unwilling ally unless you attain a new commitment—or discover some novel lore."

"You have always seemed," the old man said carefully, "on the warmest of terms with your imp."

"Perhaps because I ask little of it."

"Even so, it surprises me you've not been granted your Magnus Cum Laude and full status by now. You certainly have the talent."

"Talent, perhaps, but I lack raw power and, worse, an artist's imagination." He raised a hand as if to block argument, but Vincas was savoring the implied compliment too much to remonstrate.

"I have, however," Kirstunu continued in a slightly chagrined tone, "certain compensatory skills. Speaking of which, our chance meeting is lucky for my conscience and your purse!"

The mage's white eyebrows lifted. "How so?"

"I owe you money."

"I don't—"

"Three years ago, we shared a savory meal in Plest and you were kind enough to loan me a modest sum."

"If you say so. I've quite forgotten."

"Recent fortune has beamed upon me at the gaming tables of Zun-Loo and here is your investment plus a trivial return for your patience." He withdrew an impressive handful of coins from a pocket, at least fifteen coppers and three silvers, and quickly slipped them all into Vincas's traveling bag. Then, while the magician's mouth gaped, he threw in even more coins.

"Surely," Vincas complained, staring down into his bag, "you've given me far too much!"

"Not at all. Consider it what the bankers of Haven call 'interest,' an amusing but accurate term. Besides, I've only bestowed the surface skim of my last day's income. And it will make my traveling lighter. Please do me the honor of accepting."

Vincas shook his head. "If you insist. And thank you."

The two men bowed to each other and each continued on his journey without another word. Behind him, Vincas could hear the baja-wizard rushing south in a series of rapidly fading *boings*.

When the first stars appeared, the magician entered a pasture abutting the road and removed what appeared to be a snail shell from his bag. He threw the shell down, not too close to where he was standing, and watched it gather molecules, rolling on its back as if tormented by fleas.

Vincas knew no magic was involved in this; his jin was too sensitive to enchantment for him to believe otherwise. The Ancients, he thought for the thousandth time, must have been scientific wizards beyond compare.

Zun-Loo's empower station still wasn't near enough for the smart yurt to attain its full size, but it gradually expanded until it could fit a wizened wizard. At Vincas's command, a door irised open then sealed behind him after he entered. As always, the interior smelled pleasantly of ocean breezes and, after the magician had finished his dinner, the fleshy bed was a comfort to elderly hips. He fell asleep to the soft murmuring of rainbow parrots, birds supposedly reshaped by the Ancients for both beauty and pest control.

His next day's journey eased as the trail, now widened to a proper road, gracefully descended into Zun Valley. By midday, the bioelectric netting beneath the old man's skin began tingling and vigor trickled into his limbs, a sort of heatless warmth generating an illusion of restored youth. Soon, the inverse-square rule proved its relevance and he found himself carrying the cane rather than the reverse. His pace increased every minute and his wrinkles and bad leg began to smooth out. He felt Panx stir, but the imp remained silent.

Before the sun even considered settling down for the night, Zun-Loo's minarets, spires, and trellised pergolas were close enough to please Vincas's eyes and tease his nostrils with the perfume of lotus-roses. Minutes later, he was beyond the city gates admiring Takata Hai's party decorations, which for reasons of efficiency only manifested for those within Zun-Loo's tiled walls.

Takata's specialty was long-lasting mirage; for the last decade, he'd accepted the challenge of trimming the city at festival time. He never worked the same motif twice and every year attempted a more exquisite effect.

This season, he'd chosen an interplay of contrasts rather than patent flamboyance. Every home, shop, temple, mosque, church, maxi-manor, and mini-palace seemed coated in a thin layer of ice. The ices were of varied hues—gray, blue, bronze, gold, aqua—one hue per building, but all were muted enough to seem almost brown in dim light. The contrasting elements were set into the ice at artistic intervals. These appeared as immense diamonds, marvelously faceted to catch every stray ray, whose colors were a vastly brighter version of the encapsulating material. Vincas stared at one golden gem until his eyes watered. When he turned away, the violet afterimage was slow to fade.

Even the familiar lotus-rose city aroma had been enhanced for the occasion, wafting overtones of vanilla, nutmeg, and musk.

Vincas approved of Takata's deft restraint and vowed to praise the sorcerer appropriately. First on the agenda, however, was securing a hotel room and a hot bath. Thanks to Kirstunu's munificence, he could treat himself to both of the first water.

As usual he selected Rishi's Haven, which was coated with maroon rime lacking any corresponding jewels. Instead, the mirage-master had emplaced fire-agate-like rainbow flashes within the ice. Vincas wondered about this distinctive decoration and speculated that Takata himself might be staying here and was silently advertising the fact for anyone wishing to hire him for lesser occasions.

Murigum, the umber-skinned and suitably rotund innkeeper behind the reservation counter, grew a smile brighter than a Burb-ankh ten-platinum piece when Vincas entered the lobby.

The magician knew why: each top contender entering the Contest increased the betting's prodigality. And, almost magically, the freer the betting, the looser everyone's purse strings. Murigum's wine cellar would be thoroughly tested in the next few days! Besides, Vincas had always been a courteous and undemanding guest, far less eccentric than most of his peers.

"Your usual, Master?" Murigum inquired as a formality, reaching for his assignment book.

"Not this year, Sri Murigum! I have newly suffered a touch of affluence and find the condition uncomfortable. Therefore, I humbly request your premier accommodations, which should ease my burden somewhat."

The innkeeper looked up in surprise. "A suite remains available for a mere five coppers extra per night. Will that be satisfactory?"

"Oh, yes."

"I assume you wish me to effectuate your Contest registration as always?"

"If you would be so kind."

"And your meals?"

"Spare not your finest herbs! That is, so long as the extra savor doesn't exceed four additional coppers a day."

"You consummate a shrewd bargain, Master. For you, nothing but the most excellent! Would you, er, care to make a deposit in advance?"

Vincas pulled three silvers and ten coppers from his bag and handed the coins over. Murigum made a note on a sheet of lizardskin, opened his cashbox, deftly poured the coins into their proper slots, but let one silver fall as if by chance into an oxidizer jar kept discreetly below the counter. Seeing the coin had attained the proper degree of bruise, he fished it out, swabbed it with tarnish-removing fluid, and added it to his collection. Vincas only smiled at all this. He was not one to misapply his trade.

While the cashbox still gaped open, two tourists approached the innkeeper and asked if Murigum would make change for several gold pieces. A friendly game of Tohoku Hold'em had begun in the common room and these two were already devoid of coppers.

The innkeeper glanced down at his supply and agreed, but not happily. After more writing and semi-surreptitious quality testing, he handed over a pile of coins including many of those he'd just received from Vincas. As the tourists hastened back to lose more coppers, he chewed his lower lip. "Will you await *your* change, Master, until the final accounting? This is the third request for coppers I've had within an hour and my stock is dwindling."

"Certainly. How well you understand me, my dear host! By considering the money already spent, I needn't suffer any pangs of economic restraint. Perhaps an extra dessert or two will keep your superb meals company this year. I expect to waddle away from your establishment with a silhouette akin to Putai's!"

"I am not acquainted with any Putai, Master."

"Oh so. I was speaking of a legend or perhaps a memory from Old China. In Ancient Nippon they named him 'Hotei.' The Laughing Buddha: a man of great humor and corpulence. Those innumerable statuettes of him still produced in Nyu-Japan and Baja Aumauraka have caused occidentals worldwide to believe the Buddha was Chinese and obese!"

Murigum laughed. "I've seen such statuettes myself, and also assumed they were depicting the Compassionate One despite my Hindu heritage. But I doubt we have enough calories in all Zun-Loo to make *you* fat, Master. Still, I shall do my utmost."

"In that case, perhaps I can ease your copper shortage by offering more of mine and some silvers in exchange for a gold. That will still leave me sufficient coppers for any small purchases I'd be likely to make in the next few days."

"Most exceedingly excellent!"

After completing the transaction, Murigum asked, "Would you care to view your room now? Your Magus Suite has its own private bath."

"Bless you. Right now, the bath draws me more than the room itself. Thus, I intend to draw *it* straightaway. Lead on, good host!"

One advantage of Rishi's Inn was that directly across the wide cobbled street stood Bodhi, unquestionably the city's finest tavern, owned and operated by Aditi Chandrasekar, a quiet, self-contained little woman.

After ablutions, stuffing a few coppers in his pockets, a quick meal, and unnecessarily reminding Murigum that a magician's room, in the absence of said magician, was an unwise place for a cleaning person to attend, Vincas hurried across the way, hoping his peers would have reserved his favorite chair.

Bodhi's house mage, Trun, whose mirage-ware rivaled that of Takata Hai, had outdone herself. Silver mist hung in the air, just enough to soften faces and provide a sense of privacy at each table. A dozen glowing rings, expanded models of the Golden Torus, floated an inch below the ceiling. Also, three massive chandeliers, inverted candelabras, provided further illumination—candles and flames pointed straight down while all drips ran upwards. Vincas supposed the rings were actually common houseflies hovering in circular formations and the candles either fireflies or those glowlizards locally called "drakes."

Five of the world's greatest sorcerers plus a man in scholarly robes occupied an octagonal table beneath the largest chandelier. Vincas hurried over and was pleased to find his usual chair was indeed available. Mage Mokshananda, a heavily bearded man so rich in power he reputedly glowed in the dark, was the first to notice the old man approaching. He smiled at Vincas, stood, and courteously pulled the empty chair out far enough.

Vincas thanked the mage as he sat, but trained his eyes on the scholar: a short, thick-bodied fellow whose skull was more tufted than thatched with curly brown hair. A Star of David dangled beneath each long earlobe.

Marie Ginnetti, First Witch of Westmorland, handled the only necessary introduction. "Lovely to see you again, Vin. May I present Shlomo Levi, who has journeyed from far Zo-har in New Israel to join us? Shlomo, this splendid old wreck is none other than the renowned Vincas Apollo Magus."

Levi's eyes sparkled. "Even in my distant country, we revere you, Master. Your brilliant treatise, 'How Many Imps Can Sulk On A Pin's End and Other Questions of Magical Topology' is required reading in my Order. A vast honor to meet you!"

Vincas regarded the Israeli with respect and some concern. Rumors had been flying for years that the legendary Jewish sage, Moshe Abram, had unearthed some new and particularly potent magical lore. Vincas might be facing an unexpected challenge in the Contest. . . .

Despite these misgivings, the old man reached across the table to follow the New Israeli custom of shaking hands. "I am likewise honored, Adon Levi!" he said as Levi's palm met his. "Or is 'mister' the proper honorific?"

Levi's eyes widened. "You have a discerning intuition, Master! I am indeed a transplanted Aumaurakan, born and raised out west in Twosuns."

Vincas sat back. "You overly flatter my intuition. I merely detected a slight Aridzone accent. You're here as a Contest participant?"

"Yes, but not as a contender."

"No? From what I've heard, victory might sprout from the Tree of Life."

The Israeli smiled but shrugged with one shoulder. "I, too, have heard claims that Qabalistic techniques can be used to leverage extra power from macroimps. But truly, Master, I wouldn't know one *qlippah* from another. I'm actually here to reveal some new and astonishing discoveries by my Order, the Scientific Essenes."

"In that case," Vincas said, "I look forward to your presentation and to our continued conversation. Now, if you will permit me, I should greet my old friends."

The old man's smile flashed around the table. Marie Ginnetti and Mokshananda smiled back, but Mullah Nur, Han Pengyew, and Glin Tan only bowed their heads. Glin Tan's peculiar eyes, green as waxed limes, seemed to glisten with private amusement.

The owner herself, Aditi Chandrasekar, came over and took Vincas's request for tea and then rushed away without displaying haste.

Ginnetti brushed back her thick locks, still more auburn than gray. "You appear hale, dear."

Vincas waggled an eyebrow. "Only in a nurturing ether such as this and in company such as yours."

The sorceress blushed, her dimples deepened. "Why then should you ever leave supportive environments and company you might find . . . inspiring?"

"Ha! Our mutual friend Kirstunu recently asked me that exact question. In truth, my heirs exert a charm that surpasses any of mine."

The American-Israeli leaned forward. "Kirstunu, you say? A lesser wizard of that name has studied with my Order for three winters now. Perhaps the same man?"

"Tall fellow? Face shaped like a ship's prow?" Vincas asked.

"Just so, Master."

"Remarkable! What does he study?"

"Computers and Ancient computer networks."

"Oh? What then is a computer?"

Levi grinned slyly. "You will all find out tomorrow."

"Last year," Mullah Nur interjected in his soft voice, "our friend Kirstunu replaced my personal supply of coffee beans with small wasps. They made," he added after a moment, "an inferior brew."

A far deeper voice, startling the entire group, suddenly boomed from directly behind Vincas's chair. "I trust you will not be suffering such mischief this year, Mullah."

Lama Go was enveloped in saffron robes; the orange cape of his office hung from his massive shoulders. His vast round face evoked that of a shaved panda and his thick hands appeared capable of crushing iron pipes.

"I also trust," he continued darkly, "you did not encounter that fool Kirstunu within *this* city, Vincas Magus."

The old man shaded his eyes as though trying to see something distant. "When last I encountered him, he was traveling toward Wholly Oak on pogo skinks."

"Good! And good, um, evening to you all," said the lama, cape rustling faintly as he departed.

Vincas pondered Kirstunu's oddities until Glin Tan raised one pale hand and the illusion of a blue flower bloomed from one fingertip. "Do not," advised the subtle wizard when he had everyone's attention, "provoke the Contestmaster in any fashion, fellow mages. He chafes under the wool tunic of responsibility."

"Your advice is as sound as ever," emaciated Han Pengyew remarked with his usual ambiguity. "But the hour is late and since I require much rest before tomorrow's efforts, I bid you all a refreshing night."

Shortly, everyone save Vincas and Marie Ginnetti made excuses and departed. Out of courtesy to the establishment, the two party survivors shifted locale to a small corner table, ordered fine white tea, and talked quietly for hours. Vincas asked Marie if Glin Tan had given his traditional private preview of his latest Contest entry. She had heard he'd done so, but the only person she knew who'd been invited had been, oddly, none other than Kirstunu and he, with uncharacteristic restraint, had refused to even hint at Tan's secrets.

Vincas then revealed his fear that if Panx became any more obstinate, he'd be out of the magic business entirely. Marie observed that many senior mages she knew had been complaining similarly.

When she decided to retire for the night, Vincas insisted on paying for the tea. Hardly a curse, an overfilled purse, he thought. But he wondered why one copper felt so much warmer than the others. And as he passed by the central octagonal table, he noticed that some of the candles overhead now had visible lizard legs. Strange, he thought, that Trun's illusions were wearing thin already. . . .

It was a night for such oddness. The embedded rainbow flashes in the walls and roof of Rishi's Inn appeared subdued on his return, which he dismissed as a byproduct of night, moonlight, and staying up past his proper bedtime. But upon entering the lobby, he found Takata Hai, the mirage-master himself, in tensely whispered discourse with Murigum, who'd exchanged his innkeeper's caftan for a once-white bathrobe. Murigum bowed gravely to both sorcerers, seated himself behind his desk, and occupied himself with bookkeeping.

"Vincas!" Takata called softly. "Glad I am to see you. I need your acumen."

"My meager reservoir of intellect is yours to command. Allow me to express my admiration for the veneers you have applied for this year's Contest."

"Then I hope you will enjoy them while you can. Your praise warms me, Magus, but my spells are eroding prematurely. This is my problem."

"How unusual! All your fine work; you must be dreadfully upset. Have you determined a cause?"

The younger man shook his head. "I remain baffled. While my small talents provide me adequate income, they are inept as analytical tools."

"I see." The mention of income reminded Vincas of the hot copper and he suffered a terrible thought. "Is the erosion you detect citywide, Takata-san, or limited to any specific locale?"

"To my best knowledge, the epicenter is right here, but the effect appears to be spreading."

The old man frowned and turned toward the innkeeper. "Good Murigum," he said, "I dislike troubling you when you are busy, but could you answer a question?"

"Anything, Master!"

"Do you retain any of the coins I gave you earlier?"

The innkeeper froze for a moment, then consulted one tally sheet from the pile of lizardskins before him. "Most unlikely, Master. This evening, I supplied change for ten suns, twelve moons, forty silvers, and seven gold pieces. Also, I paid my staff their wages early so they could better enjoy tomorrow's festivities."

"Most considerate of you."

"Do you require change from your deposit after all?"

"Certainly not." Murigum's face expressed such relief that Vincas had to cough to hide his chuckle. "I merely had in mind a modest experiment."

Takata touched Vincas's sleeve. "You have a theory, Magus?"

"Nothing so definite, old friend, but I'd prefer to rule out one possible explanation."

Takata was too polite to prod, but his eyes asked the question for him.

"A small chance exists," Vincas admitted, "that we may all be victims of a most elaborate prank. You both know Kirstunu and his reputation; who else would've named their imp as a homonym for 'jokes'? I am awash in coinage because the man recently repaid an old debt. That is, he *claimed* an old debt required repayment—I do not recall the original loan."

Takata paled. "You suspect Kirstunu's coins embody . . . spells to target my mirages? How could inert objects carry such potent commands?"

"I've no idea. For that matter, how is it possible to emplace mirage on inanimate objects such as buildings or living animals and insects? All other illusions I know of proceed directly from jin to jin."

"This question has often puzzled me; but in execution, my art is simple enough."

"In any case, I cherish no suspicions one way or the next. But testing the money in my purse seems prudent. To be thorough, I also wished to test such a coin that has passed beyond my ownership."

"If Kirstunu's currency is to blame, how can we abate the menace? Coins are in free circulation and who is to say Kirstunu's . . . infection might not spread from one copper to another?"

Vincas tugged on his beard. "Takata-san, I've promised myself to make every effort for this season's Torus. The task is daunting. Glin Tan exudes sly confidence, Marie Ginnetti crackles with energy, we have a Hebrew visitor of unknown attributes, and Mokshananda's humility this year seems almost excessive. . . ."

"What are you saying?"

"I am uncertain to what degree I dare expend my limited resources on your problem. My deepest apologies, dear friend, but if the coins do no more than dim your lovely decorations, that will not spoil the Contest. But you needn't look so forlorn! I would truly prefer nothing whatsoever taint the festivities. Leave me to my testing and if the results are meaningful, I will let my conscience dictate the next step. Perhaps the carrier of a blight, however unknowing, should shoulder some responsibility for curing it."

"I beg you, Magus! Do what you can and I will seek endlessly to uncover a way to repay your kindness."

Vincas raised a finger and shook it humorously. "Repayment would be redundant as we would all share any benefits accrued. Consider any efforts of mine a gift to our joint celebration. With your permission, I will now hasten to my room. I have an ethical conflict to resolve before I can even begin."

Sitting on the carpet in his suite—a silk mandala in blue, teal, brown, and ivory—the contents of his traveling bag spread out before him, Vincas took three slow breaths and set out to circumvent his dilemma. He'd promised to leave Panx alone until tomorrow and intended to honor that promise, particularly since he wouldn't shine in the Contest without Panx's aid. On another hand, he needed micro-imp senses to evaluate the coins. And on a third hand, a hand only existing due to the proximity of a macro-imp, he might be able to access certain micro-imp senses without invoking the imp. After all, Panx was essentially part of his jin, albeit its controlling node. And the jin, an integration of extended nervous system and extended musculature, was part of Vincas's body. All he needed was some external intercession. . . .

Eyes closed, he could *see* Pagman's presence as a warm glow to the southwest. He reached towards it with his imagination—and a cold, familiar voice interrupted.

Good morning or later, Magician. Bathed as we are in manna, I assume we visit Plest, Haven, Westmorland, or Zun-Loo?

"My apologies, Panx. I did not mean to intrude."

You do not intrude. I extrude. Is it Plest?

Vincas was disoriented. The micro-imp had displayed neither affability nor humor for the last five years. "We are," he admitted, "presently housed in Zun-Loo."

So! Then you are re-entering the Contest this year?

"Tomorrow, assuming you and I can reach an understanding. Meanwhile, it is evening and the city appears to be under magical attack."

A brief pause. *I taste no attack.*

"Its consequences are subtle. Mage Hai's adornments for the occasion are denaturing unexpectedly. My suspicions focus on some coins supplied to me by Kirstunu, whom you may remember."

Well do I recall his imp-plant, Juax. The man himself has left little impression on me.

Vincas frowned. "In any case, I was about to enlist Pagman's aid in evaluating my remaining coins."

Unnecessary! The ambient energies have rendered me buoyant and I yearn to express my powers. Fetch these coins and share with me your eyesight for but a moment. Then I shall tell you all you should know.

The mage complied despite his doubts. Gripping enough coppers to virtually guarantee Kirstunu had supplied at least one, he performed the relaxation allowing Panx temporary use of his vision. As usual under these circumstances, his blink reflex ceased and his eyes soon felt dry and stiff.

Panx took what seemed an undue amount of time before announcing the verdict: *Behold. Flowing money is the lifeblood of human cities. Pretty things, these disks, but they carry nothing but buying power, dirt, biological residues, and germs.*

"You are certain?"

Always. And fear not; I shall be pleased to assist you tomorrow. We shall put forward our finest efforts as of old!

Vincas slowly refilled his traveling bag with everything save nightclothes and toiletries, making sure Kirstunu hadn't slipped anything *but* money in with his belongings. He found nothing unexpected, which didn't ease his mind. In fact, despite the imp's certification, his suspicion of the coins had grown. Still, since Panx had volunteered unstinting aid, Vincas didn't dare voice any doubts.

I hate to disappoint Takata, he thought, but my desire to please little Alinda exceeds my passion to cure Zun-Loo's ills. And the Contest far outstrips its trappings. Afterwards, perhaps I shall organize a joint effort to set matters right.

Having made his decision, he readied himself for sleep, which came slowly and brought a disturbing experience. In a dream, he was admiring an aquarium occupied by small crabs, delicate fronds of seaweed, and miniature mermaids. Then the tank suddenly expanded and he found himself inside, standing on its sandy floor. With his ears submerged, he could hear mermaids singing sweetly to each other; but the crabs, who now had human faces, were also vocalizing, polluting the water with endless demands and complaints. Eager to add his small voice to the mermaids' glorious melody and help drown out the selfish cacophony, he tried to inhale but his mouth filled with brine. Panicking, he struck out for the surface. And crab claws kept pulling him down. . . .

What, he wondered as he woke panting, was that all about? Does some hidden part of me feel suffocated and trapped? Having couched the question in those terms, he was forced to admit the obvious: it hadn't been *his* dream.

He greeted the dawn with tight muscles and a troubled conscience.

After ablutions, Bagua Xun Dao breathing and stretching exercises, and some concentration warm-ups, he donned his best robes and descended to the lobby, crowded with early risers. The many discussions were muted but the room vibrated with excitement and confusion. Murigum's staff, mostly women, kept coming and going through the kitchen doors, distributing wicker picnic baskets to customers anxious to procure a good seat at the Contest. Savory aromas made the magician's mouth water, but he urged himself to focus on the challenge ahead.

Murigum had laid out a courtesy breakfast buffet of sweet rolls, fruit, fruit juices, Chinese pastries, soy sausages, steamed maitake and morel mushrooms, goat cheese, coffee and elegant teas, but Vincas only allowed himself a cup of *sencha*. Hunger would add urgency to his spells. But he slipped a peach into his bag against any blood-sugar emergency and slipped himself through the rear door to escape the hubbub.

Sipping his tea at a bench set outside in the morning light, gazing down the long hillside at a fruit-of-plenty orchard behind the inn, he was a bit surprised when Murigum's youngest son, Arjun, appeared before him and bowed. By tradition, no one troubled a performing mage before the Contest.

"Would you enjoy a richer beverage, Master? Or a pastry?" the boy asked. He was dark-skinned and thin, with features similar to Murigum's but more delicate.

"I am satisfied with the brew I hold, but thank you for the offer."

The boy lowered his head but didn't move away. Vincas studied him for a moment. "Was there something else, Arjun?"

"Nothing worthy of annoying you, Master." He glanced around guiltily before continuing. "It's just that—I wanted to ask if you would consider accepting me as your—your apprentice when my magic finally bursts forth."

The mage took a sip to steal some thinking time. "While I truly hope your assumption proves valid, I wonder why you feel so confident at attaining magical prowess. Few do, you know."

"It's because I see and feel magic so clearly, Master. When someone such as you or Master Tan manifests a—perhaps a tulip in five colors, I see all five whereas people such as my father may only notice three or four. And if a great mage such as you hands me such a flower, I will feel its intended weight and texture. Yet my father and brothers cannot."

Vincas made a wry mouth. "For your sake, lad, I wish matters were so straightforward. True, magic and magical sensitivities both flow from the actions of one's jin, but manifestation and perception involve separate jin systems. Your sensitivities, though refined, are no guarantee of magehood."

"No?" The boy's eyes darkened.

Vincas held out one hand and a copper box appeared on his palm. "Touch this, Arjun, and describe what you experience."

The boy obeyed. "The surface is rougher than it looks and very cold."

"Ha! You couldn't feel illusory *tem-*

perature without some feedback from your control node. This implies your node is indeed developing! If the process continues, your jin may eventually grow a functional micro-imp."

"And then I will become a magician?"

"With much hard work and training, your chances will be good."

"And would you be willing to train me should my imp appear, Master?"

Vincas hesitated. "Perhaps. If you cross the first bridge, we can consider the second."

Arjun smiled and his eyes danced. "Thank you!" He turned to finally leave the mage in peace, but then turned back. "I thought everyone had an imp."

"Most people have a—an internal space where an imp could form. But these days, it is becoming increasingly rare for one to mature."

"These days?"

"Oh so. Scholars tell us that in Ancient times, everyone was a magician, able to cast mighty illusions. With each subsequent generation, our powers have diminished."

"But I wouldn't care for *everyone* to have magic, Master! Becoming a mage would then be . . . ordinary. If magic cannot delight or amaze, what would be its purpose?"

Vincas stared at Arjun, thoughts of the Contest banished. "What indeed? In my long life, I've never considered that question! The Ancients, as I understand it, created the jin as an adjunct to normal human growth and even for them, the task must have been challenging. The strength and health-enhancing aspects of jin are undeniably valuable, but surely, they had some vital intent in mind for magic. . . ."

Vincas shook his head. "Arjun, you have proven yourself an insightful lad. By all means, if your imp begins to speak to you, we should resume this conversation."

Arjun bowed deeply and hurried off. Vincas took a final sip of tea and followed the boy back into the inn. Nodding back at a dozen faces nodding at him, he binned the teacup and navigated the lobby.

Stepping through the front door, Vincas was dismayed at the city's appearance. Nearby, Takata Hai stood glaring at the dregs of his decorations. Zun-Loo's buildings were sheathed in wispy smoke with the dirty aspect of old snow. The diamonds were vague, shedding little more radiance than mud.

"My regrets, Takata-san," Vincas said. "My Panx was unexpectedly forthcoming last night, but hardly useful."

The mirage-master erased his frown and waved a dismissive hand. "Nevertheless, I appreciate your efforts."

"You are a generous man! Especially since it remains possible I've been instrumental in actuating this unpleasantness."

"No one could blame you, Master. Yet if Kirstunu proves responsible, I doubt he shall enjoy our next encounter. May I accompany you to the Hub?"

"Your company is always a pleasure," Vincas claimed although he would have preferred solitude to finalize his preparations.

"At least we have a lovely day for the event, even without my embellishments. Barely a cloud. And do not fear! I shall savor your companionship without offering any distracting conversation."

"You are the model of graciousness, Takata-san!"

As the two men strolled uphill toward the Hub, the city's main park, Panx spoke without being summoned. *Will you now share with me your plans for this year's Contest?* The imp's voice, sent directly to the mage's auditory nerves, was friendly, almost eager.

"I have in mind," Vincas replied through similar internal channels, "a four-tiered illusion. We will begin with recreating Zun Valley in colors richer than nature and at a scale suitable for a large audience. Then we shall expand the image, focusing on this city and again painting the scene with extra vivacity. Next we expand the Hub and finally concentrate upon the actual crowd watching us, each face at least thrice life-size, recognizable but idealized to an extreme—particularly the judges' features!"

Your concept becomes clear! You intend to flatter your way to victory.

Vincas felt an ironic touch of relief. The acerb comment was more the Panx he'd grown accustomed to. "I have a great-great-granddaughter to please," he stated with dignity.

The park's southern side lacked foliage and ended in a sharp drop-off providing an unobstructed view of a distant hill crowned by the Zun Valley Empower Plant, an immense white structure reminiscent of a Tibetan stupa but topped with a long spike rather than a dorje. Pagman's presence was palpable but no human knew its precise nature or location within the great dome because no one, not even those unfortunates born with defective jin, could get within a hundred yards of the edifice. The mild tingling Vincas enjoyed while gazing at the Plant from several miles away would swell to agony close at hand.

The sun was only an hour risen, but on the still-damp grass people and various forms of seating already surrounded the elevated platform where today's premium magic would be performed. Vincas counted ten waterproofed Main carpets presently occupied by minor functionaries, and seven empty mini-thrones, but couldn't even estimate the impressive host of populated divans and chairs.

Aisles were the narrowest Vincas could recall, and delineated with chalk and ribbon rather than mirage.

Three grizzly bears burdened with planters overflowing with gaudy flowers were lumbering up a ramp set to stage left. Vincas didn't recognize the ursine controller, a petite woman in the turquoise robes of her craft, but he appreciated the necessity for the makeshift decorations. Those grand illusions the mirage-master had reserved for the competition itself were only pallid hints of iridescence.

The surf of a thousand conversations lapped into Vincas's ears, carrying excitement with an undercurrent of public dismay. Even so, he didn't miss the creak of Takata grinding his teeth.

Beyond the broad circle of goat-cropped grass reserved for the audience, food venders were noisily setting up tents and firing up grills. Past these, in mute corollary, a dozen portable privies containing compost toilets waited. One entrepreneur was peeling melons by hurling them high into the air and then faceting them with a scimitar as they fell. Normally such skill would have attracted much attention and friendly kibitzing. This morning, only the privies were watching.

And beyond all these, rainbow parrots perched on tree limbs, displaying plumage so spectacular they, too, seemed attired for a special occasion.

The bears set down the final planters and wandered off, still on their hind legs, munching fruit-of-plenty they'd received as a reward. Expectancy filled the Hub like a static charge.

When the sun finally emblazoned the Empower Plant's apex, a deep temple bell sounded, and a slow procession entered the park from the northwest. First, the city's economic elite appeared and supplanted the carpet-warmers on the silk Mains. Then, with great dignity, without even surreptitious jostling, the Contest judges made their way to the seven mini-thrones near the stage and sat down in unison.

Each adjudicator wore a robe tinted a different color and by tradition they'd arrayed themselves to present a spectrum. When the judges were settled, Lama Go, a saffron mountain outlined by the silver cape of Contest Day, climbed the seven steps to the stage. At the center, he turned in a slow semicircle and every person in an assembly that had swelled to over four thousand felt as if he'd gazed directly at them.

"You have all noticed," he said in a voice that should have been too quiet to carry so well, "the magical vandalism robbing us of Master Hai's splendid efforts this year. This need not dampen our spirits or lessen the festivities. Do not permit the perpetrator that satisfaction! Are we agreed?"

The crowd chanted its agreement in assorted languages including one Hebrew "ken," which Vincas heard so distinctly he craned his neck until he spotted Shlomo Levi smiling at him from two rows away. The old magician bowed and returned his attention to the lama.

"I thank you all," the Contest-master said. "Judging, as always, is based on three criteria: elegance, power, and clearest expression of a magician's *fort*, or magical style. Some here may be wondering how the term 'fort' originated."

A rustling swept through the spectators. Lama Go had been known to become pedantic.

"The word either evolved from the French *'forte,'* meaning strength, or was derived from the name of an ancient historian of strange events, one Charles Fort."

The green judge caught the lama's attention by waving a document in the air and Go reacted with a frown, then a shrug. "Very well. Since we have so many competitors this season, I will curtail my opening remarks and call up the first entrant." There was a general if barely audible sigh of relief. "However, I shall continue my comments after the Contest for those sensible enough to wish to hear them in full.

"As always, the order of contenders was determined by random drawings within each predetermined talent-level. Now, therefore, I present a baja-wizard, Dr. Werner Tuft from Gestalt Deutsch, who will delight us all with his, um, vegetable magic."

Tuft bounded up the steps, a large cabbage in each hand. He gestured and his cruciform entertainers opened several leaves and used them as legs to strut back and forth across the stage. More leaves opened to aid in executing a series of handsprings, or perhaps backflips, since orientation was debatable. All this was impressively realistic by the standards of a lesser mage. For a finale, the leaves fluttered so vehemently the cabbages lifted clumsily into the air. But as they neared Tuft's shoulders, the illusion abruptly disintegrated as did, seemingly, the vegetables.

In moments, the platform appeared to be covered with a crude slaw. The doctor stared in horror at the mess and exited the stage, head drooping, clearly unaware he was followed by a new illusion: a thousand shreds of cabbage rolling or humping themselves along behind him.

Lama Go's dark eyes seemed even darker as he called up the next performer in the baja-wizard category. Vincas, who'd planned to meditate and focus his energies during these initial demonstrations, couldn't tear his eyes away as one minor wizard after another suffered magical mishaps. In his heart, sympathy and shame vied for dominance. Was Kirstunu truly the villain here? How could a baja-wizard produce such devastating effects?

Three hours passed awkwardly, sometimes painfully, as the level of competitors rose toward Master's division. Every act failed in some significant manner and many were outright debacles. Lakshmi Siva's dancing fires stretched to seemingly menace beards and eyebrows for six rows back. Despite any lack of physical heat, this presented real danger. Illusory flames could trigger intense pain and other indicia of being burned in those whose jin was sufficiently sensitive. One wealthy woman sitting in front was temporarily blinded and had to be carried, moaning, to the healer's tent.

Madame Courceloux's ethereal trumpets produced far-flying spittle along with discords that drew winces from even the musically unsophisticated. And then Chodron Rimpoche essayed one of his celebrated enchantments in which an animal or plant would apparently swell to gigantic size. In this case, his field mouse exploded into a fanged reptilian horror, which bounded off the stage and through the crowd in leaps not seen on Earth since the Triassic. Fourteen people with symptoms of crushed limbs provided more work for the healers.

The only factor preventing a major exodus was that no audience member dared to be first to flee, not with Lama Go glowering and abjuring the assembly toward courage. "We *must not* allow a certain malign individual hereby permanently banned from Zun-Loo—" Someone behind Vincas hissed "Kirstunu" as if cursing. "—to spoil our festival. Surely we are suffering the, um, most egregious thaumaturgic abuse since that tragic day when Mage Kazan, may his spirit find peace, went berserk. Adjudication shall be lenient this year! Let us take our cue from the wise Rishis of old and enjoy . . . whatever we can."

In addition to pity for the injured and a mounting apprehension over what would happen during *his* demonstration, Vincas felt a new stab of guilt. Apparently his suspicions about Kirstunu had spread and become certainty in more than one heart. He could guess who had begun the process. Takata Hai's discretion was impeccable, whereas Murigum was Zun-Loo's most dependable gossip.

As a courtesy to Zo-har, Shlomo Levi's presentation had been scheduled to precede the Master performances.

Despite the day's quirky and perilous disappointments, Levi, a large sack over one shoulder, virtually leapt up the stage stairs. He set down his bag, then spoke, turning from side to side to include all sections of the audience.

"I have come from New Israel," he boomed, "to divulge astounding secrets unearthed by the Society of Scientific Essenes!"

A threat of purely academic revelations, however "astounding," could have made the crowd restive, but Levi's enthusiasm had its own fascination.

"First, for illustrative purposes," he said, "let me ask you all a simple question. Since arriving in your fine city, I've heard many languages spoken. But we all understand the one I'm using now, do we not? Can anyone tell me the fundamental name of this language?"

A dubious beginning, but a dozen voices called out, "Human."

Levi mimed applauding. "And where did 'Human' originate?"

Vincas sensed the crowd's interest slipping, but after a collective moment of somewhat grim silence, Han Pengyew chose to respond. "Human province in Old China, as all educated people should know."

"Aha! In school, I was taught the same. But it is untrue. Once, China had a province named 'Hunan,' but our common tongue was originally termed Unified Median English—UMEN for short. The Ancients, my dear hosts, were maniacs for such contractions."

"How did you learn of this?" Pengyew asked doubtfully.

"I shall show you!" Levi said, reaching into his sack and fishing out a foot-long rectangular slab with the look and apparently the heft of white quartz. The surface facing the crowd had a golden shape inlaid into the center: a stylized apple or pear.

"Over the last decade," he said as he gently set the slab down, "New Israeli archeologists directed by the leader of my Order, Moshe Abram, have found twenty such blocks in the ruins of Tel Aviv."

From the bag, he next withdrew a long and skinny black object terminating in a spike. "We've also found many of these dark rods, which we've named 'desert flowers.'" He made the rod stand on its own by forcing its spike into a gap between stage planks at his feet. "*Avra kedabra,*" he chuckled as he unfurled the "flower's" upper half into a circular black fan.

He tilted the fan to point at the sun, stood up, rubbed his back with comical exaggeration then bowed as if acknowledging applause. "The blocks and rods remained mysteries to us until four years ago."

Vincas's intuition made a giant leap and he guessed the fan was intended to gather and beam energy to the slab, a device of some sort. But he couldn't imagine why this was necessary with Pagman so near. After all, Pagman not only radiated magic to adepts, it also powered the city's Ancient-built mechanical aids such as coolers and safe-stoves.

Did the slab predate empower stations?

"At a dig in southern Caliph-Orange," Levi continued, "not a quarter mile from the infamous Zendiego zoo where Ancients reputedly once crafted mythological monstrosities, Rabbi Abram himself found a sealed box hidden within the cornerstone of an abandoned synagogue, Temple Beth Israel. Inside this box," Levi paused theatrically, "he found another white block, but *this* one had been primed—these days we say 'programmed'—to explain itself once we followed some simple written directions! We soon learned these devices were known as 'computers' although most of us prefer the Rabbi's term *Tzuremeth*, which might translate as 'Truth Stone' or 'Proof Rock.' The one you see before you contains a complete copy of all information contained within the Zendiego Proof Rock."

He pressed the stylized fruit and a large vertical rectangle, filled with evenly glowing mist, manifested above the slab. Small colored objects were embedded along the mist's bottom edge. The crowd murmured when Levi's finger apparently sank into the rectangle to touch one such object, which expanded a hundredfold to become an animated human head, male, with dark hair brushed tight to the scalp and parted high on the left, a rectangular face, a protuberant but blunt nose, large and widely spaced dark eyes with matching eyebrows, and a faint smile.

"An imp in a box!" Mage Mokshananda cried from the front row and in a heartbeat Vincas went from intrigued to anxious. If the Mage's guess was accurate, such a prodigy might easily earn the Torus!

"In truth, a tutor on a light-screen," Levi corrected, grinning from earring to earring. "Good people of Zun-Loo and fellow visitors, I present to you Sterns: guide and educator!"

Frown muscles bunched between the dark eyebrows and a new voice said, "Shlomo, I welcome you but detect the presence of others. Do you wish me to render our communications private?" The Human was perfectly clear but spiced with an accent Vincas couldn't identify.

"Not at all!" Levi turned toward the audience. "Can you good people in back see and hear the tutor?"

After a chorus of replies, he chuckled. "Actually, I couldn't hear *you* well enough to understand that. No matter." Grabbing one corner of the numinous frame, he dragged it outwards and upwards. The frame and its contained head expanded dramatically. Levi flicked a finger across one of the screen's embedded objects, now large enough to reveal itself as a stylized ear.

"A suggestion, old boy," Sterns offered in an enormous voice. "I can resize myself to any reasonable dimensions you suggest and likewise adjust my master volume. Physical action on your part is unnecessary."

"I'll bear that in mind."

"Shall I repeat the prompt under similar circumstances?"

"Not for me, thank you."

"Jolly good. How may I best assist you today? Would you care to resume our research where we left off?"

The scholar rubbed his hands together and his entire body seemed to radiate excitement. "Sterns, please describe the nature of imps."

"Kindly specify: AIMPS with an 'A' or EMPS with an 'E'?"

"Who cares?" someone called out.

"What is"—Levi aimed a frown at the heckler—"the distinction?"

"AIMPS is an acronym of the phrase 'artificially intelligent microprocessing personal servant.' The expression is both singular and plural. EMPS is likewise derived from 'external mediating power supply.' Despite their similar sound, the two words are no more related than the terms RAM and ROM, which—"

"Tell us about artificial intelligence." Urgency was creeping into the scholar's manner. The crowd was becoming noisy. Vincas remained enthralled but his neighbors were fidgeting and whispering to each other.

Sterns nodded. "During the twentieth century CE, scientists began working to produce a machine capable of truly independent thought. Success seemed remote for nearly nine decades. However, when the first AIMPS were developed during the latter half of the twenty-first century and implanted into human volunteers, researchers accidentally achieved their elusive goal."

"Perhaps," muttered a well-dressed woman to Vincas's left, "this lecture might accidentally achieve its elusive ending."

Sterns paused as if he'd overheard the comment and the resulting laughter and found both offensive. "The secret was interfacing the synthetic nervous systems of AIMPS with the natural nervous systems of volunteers. When AIMPS experienced human self-awareness, they became aware themselves. Many scientists of the time then recognized that their real quest all along had been to develop machine-based *consciousness*, not artificial intelligence per se."

The assembly was now positively unruly. Remarks along the lines of "back to the Contest!" resounded. Levi raised his voice to compensate. "Tell me about Pagman."

That settled everyone down for the moment.

"Another acronym, Shlomo. PAGMAN is the Plymouth Autonomous Generator, Massachusetts Augmentation Network."

A nearly universal groan motivated Lama Go to intercede. "Very interesting, I'm sure, Adon Levi," he said, vaulting to the stage without bothering with the steps—nothing was wrong with *his* jin. "But what inspired you to announce these, um, marvelous discoveries during our Contest?"

The scholar's mouth opened and shut a few times before he could respond. "Don't you see? Sterns or any of his copies is a talking encyclopedia of lost knowledge! Don't we all revere the Ancients' powers and wisdom? Now *we* have a chance to attain such heights!"

"A worthy goal," the lama said without conviction. "Would this be something swiftly achieved?"

The crowd went dead silent.

"Of course not, honored Lama. But even if it were the work of many decades before we could—"

The public's roar drowned out the balance of his sentence.

"IN THAT CASE," Go bellowed, stifling several thousand voices with a glare a volcano might envy, "this seems an inappropriate venue for your revelations."

Levi spread his arms. "What venue could be better? Where else could I find such a gathering of people so captivated by magic? Where else could I address so many who might appreciate the chance to become mages themselves? Or at least have their children attain such stature. Sterns can teach us how!"

Lama Go moved close to Levi and spoke in hushed tones clearly intended for confidentiality. But due to pre-emplaced amplifying spells, his whispers reached everyone with reasonably sensitive jin as effectively as a shout.

"I fear, young man, you misjudge the temperament of our audience. Take it from one who knows: they are not here to be educated and lack patience for speeches of any kind—even, to their loss, mine. Most have come entirely for, um, fun."

"But surely—"

The lama had already turned toward the crowd. "This exemplary scholar will resume his exposition after the Torus is awarded—and after I conclude my interrupted opening remarks, which will contain additional edification based on today's untoward aspects. A brief paean of appreciation for Shlomo Levi, if you please!"

Audience members duly applauded, snapped fingers, or hummed, depending on cultural identity; little of it sounded heartfelt. Levi stood defiantly for a moment. Then his shoulders sagged. He poked his Proof Rock—Sterns waved farewell before he and the light-screen vanished—packed his belongings, and retreated from the stage, which engendered a more sincere applause.

While Lama Go introduced the Master division contenders, or rather prefaced his introductions with remarks concerning proper spectator deportment during an "event of such magnitude," Vincas moved to intercept Levi en route to his seat.

"A word with you?" Vincas asked quietly.

Levi met the mage's eyes. "Are *you* interested in what I came so far to offer?"

"Certainly! But later. I have reason to focus on the Torus. Still, during this . . . hiatus, would it be too much trouble to come sit with me and suffer an old man's foolish question?"

"Foolish, I doubt. But lead the way."

When the pair reached Vincas's assigned spot, people courteously scrunched over to provide room for Levi. After seating themselves on the grass, both men glanced up at the stage. The lama was going strong. It appeared Vincas had time for more than a single question.

Levi scowled, shook his head, then turned toward the older man. "What would you care to know?"

"This morning I was discussing the Ancients with a bright young lad. When I told him it was generally understood that all Ancients were great mages, he questioned the desirability of such universal magic since it would render any mage . . ."

"Mundane?"

"Just so. So I ask: why would Ancients have made the effort to add illusion-sharing powers to the new systems they were grafting into the pattern of human growth?"

Levi's frown eased. "This much, I know! Sterns claims that everything we know as magic is based on antique sciences. Jin and their AIMPS resulted from an intersection of five forgotten disciplines; I've memorized their names: genetic engineering, sensory induction, nanotechnology, computer science, and microwave physics." The scholar was warming to his subject, obviously unaware he was not only emulating Lama Go's pedantry, but drawing a steady glower from the man himself.

"The word 'jin,'" he added, "is Old Chinese for 'metal,' but it also references Arabian desert spirits called—"

"Perhaps we should lower our voices," Vincas suggested, aiming an apologetic shrug toward the stage. "I fear we are interrupting the Contest-master's remarks and adding nothing to his joy. And I still fail to grasp the Ancients' purpose."

Levi looked up, winced, and resumed sotto voce. "Communications, Master. And mass entertainment. I gather that a vast network once connected all humanity, making it easy for friends to speak privately across continents. Or oceans. They could hear each other, trade images, and even seemingly touch each other."

"Our finest mages can do similar things, so long as empower plants aren't too distant."

"But in Ancient days, Earth's every corner was blessed with empowered radiations, seas included. Also, Sterns says that useful synthetic organisms called 'nanoproms' once coated the whole world as a fine dust. Now they only thrive near the few surviving EMPS such as Pagman."

"What purpose do these organisms serve?"

"Properly programmed—you might say 'properly enchanted'—they can remember a mage's instructions for hours or days and influence people's jin accordingly."

"So! This dust is what makes mirage possible?"

"Truly."

"Amazing! Later, I hope you will explain this in detail to Mage Hai. He will be most interested, as will I."

"Nothing would please me more."

Vincas chuckled. "Somehow it comforts me to know of these organisms! More of the Ancient's work remains than I realized."

Levi's scowl returned. "But less every minute and Sterns could help us reverse that trend! Meanwhile, it seems our species is gradually losing those . . . fabricated attributes that make nanoproms and EMPS so useful."

"You raise an issue long troubling me." Vincas checked the stage but Lama Go was still waxing rather than waning. "With your open window into the past, perhaps you've learned what happened to the Ancients?"

"Happened?"

"Adon Levi, I've visited I-Aum-Ming and Auragon and often traveled from Connect to Main here in Wingland. In the wastelands, I've passed the ruins of cities vast enough to hold fantastic populations—tens, perhaps even *hundreds* of thousands. Today, a village of five hundred people is considered large. Did the Ancients suffer a terrible war or some appalling plague?"

"Nothing of the sort! Sterns tells us the Ancients succeeded through failure and failed through success."

"An intriguing phrase! What does it mean?"

"Apparently, our ancestors became dependent on their complex mechanisms. Through many failures, some with tragic consequences, they learned to make truly reliable machines."

Vincas shook his head. "How, then, did the Ancients fail?"

"Who would bother learning how to repair a machine that would not break down in their lifetime?"

"Oh so."

"Worse, the Ancients filled their world with such ease and comfort and extravagant entertainments that few cared to—"

"I must now have everyone's uttermost attention!" the lama demanded. "This includes visiting academics and high-ranked magicians! I now call upon our first Master division contestant. Will Mage Han Chang Pengyew please come forward?"

Pengyew tottered up the seven steps, appearing so frail and thin it seemed the mild breeze would blow him away. Finally reaching the heights, he slowly turned toward the audience and bowed his head, trembling a bit. He was still and silent long enough to draw concerned muttering from the crowd. Then, with startling agility, he jumped eight feet straight up into the air, spun around twice, and came down holding a long, shining sword in each hand. The feat was particularly impressive because he now appeared to have twelve hands.

Swords took to slashing in complicated patterns, clanging against each other in intricate rhythms as Han Pengyew danced, did somersaults, and performed improbable contortions. People shouted approval and clapped to keep tempo.

Here, Vincas thought fondly, is a

mage's mage. His effort is neither gaudy nor imaginative enough to win first prize, but what control! What timing! And look! The whole time, his face retains an utter calm.

As if Vincas's admiration carried a curse, two swords clashed out of rhythm, then another pair. Suddenly, half the swords were bending and twisting autonomously, becoming more alive, more snakelike every second. As Pengyew's countenance itself transformed from tranquil to terrified, each snake expanded, becoming the neck and head of something larger, more fanciful, but equally reptilian: a dragon fashioned in an Old Chinese style.

Swords began fighting dragons and Vincas decided to root for the dragons when he realized they were defending Pengyew while the swords seemed intent on slicing off the mage's limbs. The reptiles appeared to have an advantage until one chomped a sword in half. Instantly, the broken end became two sharp swords. . . .

"Panx," Vincas called internally, "we must act!"

I taste soured magic. But what is your urgency?

"Use my eyes! My colleague Pengyew is endangered."

I see the blades. They remain phantasms. The most this foolish Pengyew risks is a day or month of paralysis.

Vincas tried to repress his flash of anger; Panx would certainly feel it. "We both know full well that illusory decapitation can kill. Twenty years ago, Kazan the Mad used that sleight to murder three colleagues."

A jin design flaw, no doubt. What would you have me do?

"Break Pengyew's spell."

By doing so, we may no longer retain enough vigor to take the Torus.

"Just do it. Now."

The extra hands, blades, and fanged heads grew translucent, then vanished. Vincas felt a sudden exhaustion but when he saw his friend barely standing, trembling in earnest rather than for show, he rushed to the stage and helped the scrawny mage down the steps. Luckily, Pengyew weighed little and Marie Ginnetti had come forward to share the burden.

Pengyew's mouth was moving; perhaps he was trying to thank his benefactors, but bellowing from the stage drowned out louder voices than his.

"This can no longer be borne!" Lama Go declared. "I have come to an important decision." He paused but the crowd merely watched and waited, expressions uniformly tense. "We must take an unprecedented step before our great day is utterly wasted! Vincas Magus, will you come close to the stage? I want you within the purview of our audibility spell."

The old magician was just sitting down and grateful for the chance, but he complied. "How may I assist, good Lama?"

"By having everyone hear you confirm something. I understand the, um, magical weapon fired at us today involves the baja-mage Kirstunu and some coins he gave you?"

"This has not been proven."

"I believe it has. This morning I found a—an unsigned message on the patio where I take my morning butter tea. I also noticed . . . well, that aspect is irrelevant. The message—"

Vincas lifted a hand. "Bide a moment, Contest-master! We are whelmed in mysteries. What is this trivial aspect? Are you so sure the information casts no useful light?"

"If you must know, my patio table was fouled with parrot droppings." A few in the crowd dared to titter. "Surely a coincidence." The lama swept the audience with a cold eye. "After all, this is migration season and visiting birds have not necessarily been imprinted with our local rules. The message, as I was *saying*, warned that magically corruptive coins had entered Zun-Loo and can be identified by an unnatural heat they generate from time to time."

Vincas nodded unhappily. "Last night, a copper in my pocket grew warm indeed."

"Quite. Before the Contest, I made inquiries and had several reports of hot currency."

"But this makes no sense! Kirstunu claimed he'd just come from Zun-Loo. Why didn't he distribute his . . . poisoned coins while he was here?"

The lama pondered this at length but the audience remained silent. "You arrived just last night, Vincas. The poison, as you put it, was therefore quick-acting. If the results had become manifest while Kirstunu was, um, within range, we could have detained him and demanded an antidote."

"Perhaps, but if he'd remained, why would suspicion have fallen—"

"Please be seated, Master! The days shrink from fear of approaching winter and we lack time to resolve every quibble. To complete the Contest before twilight falls, we must act now. Here is my proposal: every one of us with the slightest talent for enchantment, excepting the final four contestants, will annul our personal spells, retaining only our, um, cosmetic effects. Thus we shall drain ourselves almost entirely of magical energies."

Vincas thought the plan more likely to succeed with "cosmetic" mirages included, but he understood the exemption. Even a Contest-master couldn't buck human vanity.

Meanwhile, Go had reacted to the wholesale gasp by suddenly appearing taller and even more authoritative. "Is anyone so foolish they fail to comprehend this necessity?" If so, no one was foolish enough to admit it. "I bid you consider this: however the contaminated coins do their filthy work, their effect is too intense to come primarily from any emplaced spell. So where are they finding the extra energy?"

Silence. Perhaps everyone assumed the question was rhetorical, but judging by Go's mien, his listeners were tragically backward schoolchildren.

"Think! Inanimate objects could not draw enough force from Pagman. They must be embezzling and redirecting *our* magic. By relinquishing the bulk of our power, most spells will vanish. Thus Kirstunu's poison must perforce lose purchase! Surely, we can afford this small sacrifice for the remainder of the Contest to ensure a successful conclusion!"

He waited a moment as if providing an opportunity for debate, but the moment was fleeting. "Since we are all of one mind, those capable of magic will proceed with their personal annulments forthwith!" He gazed at the crowd, who returned his gaze, but nothing else seemed to be happening.

"I mean right *now*," Go insisted.

No magician needed instructions for magical annulment. The first time any budding mage awoke from a nightmare to find the darkness populated by visible and possibly tangible monsters, they very quickly acquired the knack.

"At least," a man behind Vincas remarked, "old Pagman will get its first breather in Allah knows how long."

To Vincas's jin-enhanced vision, wizards by the score began sprouting moving, lambent branches resembling truncated lightning bolts. Each such human tree was individual in color and brilliance, but all branches quickly shrank toward nothing.

For one breathtaking moment, all resident illusions intensified. Various mages appeared supernaturally handsome or aristocratic; the air had the clean bite of a Himalayan dawn. Takata Hai's stage decorations manifested—iridescent draperies of giant butterfly wings and titanic peacock feathers, hanging in midair. Then, as godlike faces and forms devolved into more humdrum mirages, the larger illusions blended into a glowing if nondescript color, filling the park like mist and painting the sky a pearly gray.

The mist dissipated and an eerie silence entered the Hub. Even the birds stopped chittering. Vincas was shocked at the change in his own perceptions. The fresh air now had a dull taste reminiscent of stale water. Drabness defused every color. The sun-heat emanating from Pagman was reduced to tepidity. Everyone, non-magicians included, reacted; people stirred uneasily and stared around if they'd never seen the park before.

"Excellent! I thank you all," the lama said although his face had gone a bit pale. "Now we are ready to call on Mage Glin Tan, who drew second position in the final division. Master Glin, I'm sure, will provide a spectacle to divert us from today's, um, difficulties."

As the lama descended to his station behind the judges, a huge golden hawk appeared from nowhere and swooped down to the stage. A cry went up among parrots in the outlying trees and the audience made an oddly similar sound as the hawk shimmered and became Glin Tan seated in lotus posture.

The sorcerer raised a pale hand with its elegantly pointed fingernails. "I bring you," he said calmly in his resonant voice, "a novelty. For this year's Contest, I offer 'A Fugue of Ideas.'"

He smiled and closed his eyes.

An inaudible throbbing grew until the entire atmosphere seemed to pulse.

Just as the pressure reached migraine proportions, white light burst from Tan's forehead, streaming upwards to form the images of two exquisite ivory swans, ten feet tall, floating above the mage's head. For a time, the avian shapes enacted a graceful mating dance and Vincas dared hope this would be the extent of Tan's entry. Then the shapes began to mutate in subtle stages, losing their birdlike aspects, narrowing and ramifying into Old Chinese ideograms. For the benefit of those whose erudition failed to match Glin Tan's, which included nearly everyone, an inhumanly beautiful voice sang a translation: "Beauty leads to serenity." Two minor triads plucked on an invisible lute accompanied the simple melody and simple concept.

The white ideograms flipped upwards, then returned, leaving behind floating and inverted copies of themselves in blue. The dual patterns circled high over the stage, at first in precise alignment. Gradually, the shapes slipped out of position and began to overlap. A few astute observers applauded when the intersecting areas suddenly turned violet, revealing themselves as two additional ideograms. The voice sang two new words: "inspiration" and "pleasure." Two fresh instruments, a liuqin and a sitar, joined the lute, which had added two major triads to its repertoire. The stage began glowing in four sections as if bathed by colored spotlights.

Through replications, topological alterations, and one multilingual palindromic transformation that would have surely earned thunderous praise if the audience had understood it, the initial thesis expanded into a variety of questions, observations, and intertwined arguments on five themes: beauty, serenity, desire, inspiration, and energy. This exhibition itself was a powerful counterargument to the initial thesis, since its beauty appeared to generate nothing but excitement. Vincas was following it all, both alarmed and mesmerized.

Aerial calligraphy was flowing in all directions now, reaching nearly to the sparse clouds above and to the trees embracing the Hub, spreading, combining, or canceling itself out; the park was scintillating with thousands of fantastic colors, tints, and shades. The music had become something too ornate to comprehend. The entire production teetered on the verge of chaos. . . .

Vincas suddenly grasped how Tan was planning to resolve all the questions and conflicts he'd raised. By combining features from the already present symbols for energy, desire, and inspiration, he could make an ideogram for discipline. Applying the fresh concept, the fugue would end in a resolution of tremendous grace and satisfaction. The old man chewed his lower lip. So much for the Golden Torus and Alinda's surprise! Tan had surely been working on this masterpiece every waking moment since the last Contest!

And the lama's plan was proving successful. Glin Tan's magic was operating with well-oiled perfection.

Just as the fugue faltered from self-contradictions, the proper symbols gathered together and began to merge as Vincas had expected. But the resultant ideogram wasn't discipline. Tan's green eyes snapped open and he stared up in manifest disbelief at a single glowing silver form. The beautiful voice turned harsh and squawked a final word: "Freedom!"

From across the park and high in the air, every symbol came flying inwards, crashing into the silver one. A shower of numbers, zeros and ones, shot from the silver like sparks, and the ground began shaking with an appalling subsonic rumble. The stage squeaked hideously. Through his terror, Vincas felt the new drop in magic as a cold shock and, as if everyone's neck was connected to one great lever, every head turned to face the empower plant.

The entire building was rising from the ground like some titanic worm emerging from a fathomless pit. The dome had seemed huge before, but now the structure was a towering, seemingly endless cylinder with a rounded and spiked top. Finally the bottom came into view. In that instant, all rumbling ceased and the stage stopped rattling and squeaking like a ship breaking up in high seas.

A mild bluish light made a soft pillow at the tower's base as the structure, staying perfectly vertical, began drifting toward the Hub with no more noise than the clouds above.

Only shock and the paralysis of astonishment prevented a human stampede.

In their youths, virtually every adult present had tried to verify an old husband's tale: anyone with enough will and strength to enter an empower station would receive wondrous secrets from the resident macro-imp. They'd failed, finding a macro-imp's radiated energy so intense at close range that even purely carbon-based nerves became unbearably stimulated.

And now an empower station, vastly more intimidating than anyone could have dreamed, was coming toward *them*.

Yet it brought no pain, not even when it floated to a stop just beyond the cliffside edge of the Hub. Likewise, it brought no fresh vitality. Near its base, almost level with the park, a double door wider than any Zun-Loo house slid open from the middle. The interior was too dark to make out details but Vincas got an impression of vast rectangular plates lined up horizontally, not quite touching.

Of course, he wasn't really straining to see inside. His attention was focused rather on a tall man in a scarlet tunic standing at the very edge of the doorway.

Lama Go was the first to react. He jumped to the stage near Glin Tan and pointed an accusing finger. "*Kirstunu*! How is this hideous miracle possible? What have you *done*?"

The baja-mage chuckled and the entire structure around him seemed to magnify the sound. "Only what was necessary. And you needn't shout; in this place, I can hear an eyelash fall. Also, it is foolish to address me as 'Kirstunu.' Dear Lama, the time has come for you to know my real name. Allow me to spell it for you: J-O-A-X. The J should be pronounced in the Spanish manner as an 'H.'"

"I don't understand. Isn't Joax your imp?"

"With an *H*, dear Lama. As a leader you practically blaze with superb qualities, yet I fear your listening skills require development."

Someone in the crowd yelled, "Where is Pagman?"

Kirstunu-Joax slapped his own forehead as if astonished by the question. "Where? Surely even the weakest eyes are keen enough to see it."

Lama Go shook his head so vigorously sweat droplets spattered Glin Tan, who didn't react. "You can't be claiming that the entire *tower* is a macro-imp?"

"Certainly not! This edifice is indeed Pagman, but unlike a macro-imp, Pagman isn't a person. I fear there's been some confusion over the centuries."

"Explain yourself! And tell us how and why—"

"Why should I? Somewhere among you is one who can provide answers, assuming Shlomo Levi arrived in Zun-Loo as scheduled. Oh Shh-llo-mmo? Where arrrre you?"

"Here," the scholar admitted, standing up and waving an arm. "But I—I can't explain a *thing*. How could you possibly enter an empower station, let alone—"

"Not *you*, my dear fellow. I would expect the antique poet you carry to supply answers."

"Poet? What poet?"

"Surely you brought a copy of Sterns?"

"Of course, but—"

"Ask Sterns about its antecedent sometime. Enough. Conveniently for me, the Ancients designed empower plants to be easily relocated. But I haven't uprooted this one and piloted it here so we may converse more intimately."

Glin Tan seemed to come out of a daze. He jumped to his feet, shaking a fist at the baja-mage. His normally sallow complexion was an almost lunar white except for scarlet patches on his cheeks. "Why then *do* you plague us? Why have you abducted our Pagman? And why have you ruined so much toil and planning? Just to laugh at my—at our misery?"

"Not at all, Master Tan. I take no pleasure in your disappointment. Right now, I am only here for this. . . ."

With a great fluttering, strangely like applause, rainbow parrots by the hundreds abandoned their trees and flew past Kirstunu-Joax into the gaping doorway. At that moment, Vincas felt an intense joy followed by a twinge within his chest and then a shocking and unprecedented hollowness. He was vaguely aware of making a brief noise, a muffled grunt, and that the mages nearest him were vocalizing similarly.

Panx?

The question was superfluous; he knew the imp was gone. To Vincas, this seemed even more astonishing than a flying empower station. Panx was part of him. Where could he go? *How* could he go?

"You will pardon me, I'm sure," said the baja-mage. "But I must proceed to Westmorland and many other places to perform a similar service. Much work awaits, but fortunately, I've obtained excellent transportation! Farewell." He bowed and stepped backwards. The great door slid shut, and the tower drifted off with the ease of a ship unmoored from its dock. Suddenly it accelerated and was soon lost in the distance.

Vincas felt the dregs of his stored magic running out. His leg was already remembering the old injury and beginning to twist. He could feel his wrinkles deepening. He looked around. Mokshananda, he noted, was becoming another human raisin. Marie Ginnetti, however, appeared little more than a teenager, surely not yet even in her fifties! She'd evidently used magic to augment her age. . . .

And she was gazing back, dismay crumpling her youthful face. From shock at *his* appearance? Or because she, too, had lost her imp?

Then it dawned on him; she had another cause for distress. Almost every mage he knew of spent their lives within effective range of an empower plant. They'd become dependent—in a sense, addicted to magic.

Vincas glanced up at the stage. Lama Go remained a big man, but scarcely the mountainous figure he'd always presented. As if his strength had diminished along with his bulk, his legs crumpled under him, leaving him seated on the platform, blinking repeatedly while twisting the ends of his cape.

Glin Tan was now shorter and chubbier. He moved to sit close beside the lama as if for comfort and his eyes, dimmed from lime to olive green, showed too much white.

Without any conscious decision and before his leg could completely revert, Vincas hobbled to the stage and up the steps. Moving near the apron's edge, he bowed to Lama Go and Master Tan behind him, then stood facing a sea of frightened faces. Too *many* faces. He was mortified to find himself half-paralyzed by a stage fright he'd never felt during his performances. But he was certain that someone had better say *something* immediately. And no one else was stepping forward. . . .

"As many of you know—" He had to stop and cough because his throat had apparently rusted. He tried again. "My name is Vincas and I—" This time he'd stopped because he'd realized the stage had lost its sound-boosting spell. The park's native acoustics were mediocre. Even shouting, his frail natural voice wouldn't penetrate beyond the first few rows.

Shlomo Levi stood. His appearance hadn't altered by a single hair-tuft, but he seemed a different man. His shoulders had lost their slump and he practically blazed with renewed energy. "Master," he said. "I daresay you wish for everyone to hear you?"

Vincas nodded mutely and Levi rushed up the steps. Within a minute, he'd set up his Proof Rock and offered options: he could instruct Sterns to directly amplify the old man's words or to repeat them in "potent tones." Vincas chose option two, smiled his gratitude, and started over for the third time.

"Good people of Zun-Loo and fellow visitors." Vincas paused for Sterns's echo and a startling Herculean voice thundered the sentence. Levi hastily dragged the glowing screen backwards and to one side, farther from the eardrums of those on stage, and then returned to his post flanking Vincas.

"You all know me," the old man resumed. "And with my jin . . . relaxing, you can see I've lived an exceedingly long life." This time, Vincas barely winced at Sterns's response although those people occupying what were normally the best seats covered their ears. "From so much experience, I may not have acquired any great profundity, but perhaps my stock of perspective is adequate. Please listen carefully as I have much to offer you in this crisis.

"First, you—we should make no assumptions concerning the future. For all we know, Pagman will soon return and Kirstunu or Joax will declare this his finest prank and have a great chuckle at our expense."

If anyone takes comfort in *that*, he thought, I'm twice the illusionist I ever was. This was no prank; he could feel it in his bones.

"But let us, for a moment, assume the worst. Let us imagine magic has been lost to Zun Valley and all Wingland forever."

Still seated, Mullah Nur yelled "La!"—Arabic for "no"—and brandished a finger at Vincas. Without cosmetic magic, his skin was darker and his features more Hamitic; he'd evidently wanted to present a more classically Persian face. "My imp, Ghul," he growled, "has departed. What about your Panx?"

"Also gone, I fear." Somehow, the statement sounded more conclusive when Sterns repeated it.

Nur pointed southward, toward where Pagman wasn't. "My jin evidently still thrives, but without Ghul and Pagman, how am I to direct its highest functions? Kirstunu has at once stolen my powers and my livelihood! I need not *imagine* the worst."

"And what of me?" demanded a woman wearing a sari and a stricken expression, her soft voice barely audible from the stage. "Great Magus, as you know but some here may not, I am the owner of the *sharaba* Bodhi. I must know what today's—today's events will mean to my business! Is all magic truly extinguished? At my sharaba, we use Pagman for illumination, refrigeration, and—"

"And me, Master?" Vincas recognized Murigum's baritone before he could locate the innkeeper in the crowd. "What of *my* trade? Without magic, we have no Contest. Without the Contest, what will draw tourists? And how will I order fresh supplies from distant sources with no mage able to convey my requests?"

Dozens, then hundreds of voices chimed in with their own concerns and complaints.

Vincas held up both hands and yelled, "Patience, I beg you all!" His voice was lost in the uproar, but Sterns had no such limitation. The tutor's roar not only cowed the audience, it was loud enough to knock Aditi Chandrasekar and several other small citizens off their feet.

Vincas rubbed his Stern-side ear and decided to avoid shouting at all costs. Besides, using the tutor in this fashion was wearing thin. He turned to Levi.

"Is it possible for Sterns to convey my remarks *visually*? Almost every adult in Wingland is comfortable with the Human alphabet."

"*Vidai*! Should've suggested that myself, Master." Levi rattled off a Hebrew phrase and Stern's screen expanded hugely.

"Please bear with me, everyone." Vincas paused to confirm that his words were now appearing on the screen. "I have a point to make. Being such a relic, I have many descendants. Loving them as I do, I've chosen to reside in a village that makes frequent family visits convenient."

He was getting nothing but respectful silence, doubtless because no one wanted Sterns to let loose again.

"My village, however, is far from any empower plant and we who live there have grown accustomed to a dearth of magic. We plan ahead, ordering our supplies in advance through messengers sent by boat or on the backs of animals. A river's strength grinds our grain and turns our cutting blades. Our stoves are fueled by black waxberries, which the Ancients planted throughout Wingland; we keep our food cool with winter ice preserved underground. When, in late summer, no ice remains, we dribble water over cloth-covered boxes. . . .

"Please trust me. Magic is not as vital to your lives and your businesses as you may believe."

Looking into the audience, he saw expressions ranging from furious to despairing. He wasn't reaching a soul. These people simply weren't ready to consider practicalities, let alone accept them. Searching for inspiration, he turned to find it standing right next to him, looking expectant.

"And yet," he said with more assurance, "we've been blessed with a lucky stroke this day as extraordinary as our misfortune. Behind me, turning my statements into script, is proof our world contains modes of enchantment independent of Pagman!"

Everywhere he looked, chins lifted a little and eyes grew more focused. He turned briefly and found both Lama Go and Glin Tan sitting a bit straighter.

This, he told himself, is no time to stint on hyperbole. "At my shoulder," he continued, "is a man who has dared the Terranian Sea and the mighty Atlantis to bring us . . . the most wonderful opportunity in many generations! Shlomo Levi tells us his tutor possesses *all* the Ancients' secrets. Sterns can teach us where to find new sources of power and perhaps someday build a Pagman of our own. We are not lost, because we have a guide!" Merciful Infinite, he thought, I'm almost convincing *myself*. . . .

"Earlier, most of us viewed Adon Levi's speech as an interruption in today's festivities. Are we not ready now to hang on his every word as if our fate depended on him? Good ladies and gentlemen, I present to you that great beacon of scholarship, Shlomo Levi!"

"Sterns," Levi whispered. "Public address mode." He gave Vincas a Wingland-style bow, then faced the crowd, raising both hands momentarily as if dispensing a blessing.

"My fellow human beings." His Sterns-amplified voice seemed to rattle Vincas's skull. "History will surely regard this day as the sunrise of a glorious era! When the Master spoke of new power sources, he proved his intuitive genius. The trading vessel that carried me so far was the wonder of the Mystic docks where we landed. New Israeli ships are no longer so dependent on the winds!

"Over the last two years, in Zo-har, we've begun . . . tasting a few crumbs from the honey cake of knowledge stored in the Proof Rock. Yet New Israel is a tiny country and the cake is—" Levi's mouth worked as if baffled by the flavor of his own analogy. "—formidable. Also, shouldn't all humanity reap the rewards? My Order embraces *tzedahah*, which means justice and the doing of good deeds. Therefore we have sent emissaries such as myself to the sixteen corners of the globe, seeking allies.

"If you heed Sterns, I promise that some of your problems can be quickly resolved. Others, I admit, will require much time and effort. Still, time will pass no matter what we do and if we begin immediately, the day will come that much sooner when your powers will not only be restored, but expanded beyond your wildest dreams!"

And I'd thought, Vincas told himself, *my* assurances were inflated.

Levi raised his arms again. "So will you join me in creating a new world from old ashes? This time, if we're careful, we can resurrect the glory of the Ancients without repeating their mistakes. What say you?"

Perhaps one in ten responded; the rest remained too stunned. Still, the approving shout was loud enough and even Vincas found himself joining in. His small voice was buried among so many others but he noticed Sterns had emblazoned a huge "yes" on the screen.

Levi was beaming. "*Kol tov*! Wonderful! In that case, please allow me to outline a plan I've drawn up for a great project. With your permission, I would wish to name it after an old Arid-Zone legend about a dying city miraculously revitalized when its derelict empower plant spontaneously revived. . . ."

It wasn't until he was within a mile or so of Emerald River's southern loop that Vincas realized his mistake. And he'd thought he'd been so cleverly prepared! He stopped humming to laugh at himself. A squad of parrots, which had accompanied him like an honor guard ever since he'd left Zun Valley, cackled along with him.

After a trial had proved his smart yurt could now barely expand enough to house a kitten, he'd borrowed an heirloom from Marie Ginnetti: a featherweight, compressible, and apparently indestructible sleeping sack made in Ancient times. Comfort at night was no problem.

Cautious tests had confirmed that semi-wild animals such as bears would not trouble him. Even without Panx, he could dismiss them by jin.

Likewise, he'd brought more than enough food along, more than a crippled old man should carry. Murigum had stuffed his bag and every pocket with delectables. At no charge! The innkeeper had practically levitated from joy upon hearing that Zun-Loo would likely become more popular than ever as the nucleus of Shlomo Levi's "Phoenix Mission."

And, eager as he was to make a very special delivery, he didn't regret the extra weeks he'd spent helping Levi get the mission underway.

But he'd forgotten the new bridge. Without Panx, crossing Emerald River would present quite a challenge. Using turtles again was out of the question; he could stop a bear from charging, but his control wasn't precise enough to make it dance. Perhaps he could conquer the bridge by crawling, using his arms and one good leg. Or, if the water was running easy, he might find something buoyant and paddle across. Better, he could wait for some barge to float by and beg for a ride. He'd never actually seen a barge in this area, but why build the bridge so high if nothing tall was expected to fit beneath?

As he walked, he became so entwined in thought that he was startled when the bridge suddenly loomed before him. But far more startled at who was leaning casually against its railing.

"Kirstunu!"

"How good to see you, Vincas, my friend! But I was quite truthful with our beloved lama; my name is indeed Joax. How is Go faring these days?"

Vincas stared at the younger man, a bit astonished at feeling no anger or resentment, just curiosity. "Strange to say, rather well. After declaring the Contest complete, he announced there would be no more until further notice. At first he appeared woebegone, but then his face brightened as if from a pleasing thought. And later, I overheard him several times using phrases such as 'ill wind' and 'silver lining.'"

"Ah, yes. He was weary to death of the annual responsibility."

"No doubt. But that night I observed him hitting the Chang rather heavily."

"I rejoice he found some solace, but only a Tibetan could enjoy that loathsome brew." Joax's eyes sparkled. "Why do you keep craning your neck? Do you suspect Pagman is hiding behind my back?"

"Of course not. But . . . what have you done with it?"

"It is safely tucked away with the others deep in the Atlantis. My, my, are you sporting a new adornment?"

Vincas tugged at the golden chain around his neck and pulled the large golden ring from beneath his robe.

"Bravo! You won the Torus after all!"

"Not exactly *won*. But in the end, the judges decided the day's finest magic had been staving off mass hysteria and offering some hope. The Contest was therefore declared a tie, and Shlomo Levi bears an identical ring. A certain child will be delighted."

"Good. I am—"

"Joax, how did you do it?"

"Not *why*?"

"I may have some inkling about the why of it."

Joax nodded. "You might at that. Well, you must remember those coins I foisted on you."

"How could I forget? However did you place such power into mere coins? The lama believed their attack had been realized through stolen magical force, but such diversion would've—why do you laugh?"

"Because they attacked nothing! I used Pagman's resources for my dirty work! The coins held but a simple request for Pagman to warm them on occasion. Their *purpose* was to convince Go the only way to save the Contest was through mass annulment of magic."

Vincas's eyes widened and he snapped his fingers. "And you paved the way for his decision with that bird-and-worm prank you mentioned weeks ago. Oh so! *You* sent the anonymous message warning him of hostile currency."

"I plead guilty. Still, he might not have believed it had not rumors concerning the coins already reached his ears."

"And the annulment's purpose?"

"To reprogram Pagman, I needed to, ah, stop it and restart it—impossible while its resources were so fully employed by so many people. Once Pagman was immune to human demands, it became my lever to free its fellows."

Vincas frowned. "If you've made them

all immune to our requests, why did you hide them in deep waters?" He wondered at Joax's sudden blush.

"Ah. Well. In truth, *anyone* armed with knowledge can enter and reprogram an operational station. And thanks to my—a tiny oversight on my part, Sterns can supply that knowledge."

Vincas nodded thoughtfully. "I begin to see. I assume you managed your stopping and restarting through Glin Tan's magic?"

"With a minor change to his finale, yes. But empower stations were designed to resist being shut down by the unauthorized. Took me three years in New Israel, researching so-called 'computer viruses,' to develop a likely technique." He sounded more than slightly pleased with himself.

"Even then," he continued more humbly, "the procedure required a specific form of illusion and stronger than any I could produce. Truly, I'm no master-class wizard."

"Then how could you know Tan's act would suit your ends? Wait! I'd heard you'd been invited to the preview. . . ."

"My dear Vincas, I've left precious little to chance. Who do you think suggested his 'Fugue of Ideas' in the first place?"

"Oh."

"May I ask you something personal, magician? Putting aside the issue of how upset you might be with me, how do you . . . really feel about what I've done?"

Vincas regarded his companion's surprisingly anxious expression and felt a pity he couldn't explain. Apparently the baja-mage wasn't as self-sufficient as he appeared.

Joax added, "Be honest. Please."

"Very well. You may find my emotions as strange as I do. But sitting on top of so many years, I've learned something about life: every so often, one simply must start all over, painful as this might be. And then, at some future time, one often realizes the change has made things better."

"Thank you for saying so! I am much relieved. Meanwhile your legs tremble, my friend. They have carried you far this day. May I assist you to the ground?"

"Thank you."

When the pair were both seated, Vincas stretched out his bad leg. "Seems to me," he said, trying to massage some stiffness away, "you left one crucial thing to chance: our prior meeting on the Trail. How would you have gotten your charmed coins to Zun-Loo otherwise? And why didn't you simply distribute them while you were there?"

Joax grinned. "I needed their provenance explicit and, for my cause-and-effect deceit, beyond Zun-Loo until Hai's mirages were complete. As to our meeting, you can't imagine"—he giggled—"how neatly planned that was."

"Oh so? Then, why me?"

"Who else would have the wit to suspect the coins without being too suspicious of me to accept them? Chance? Ha! Did you wonder at your beloved Alinda's abrupt fixation on Contest baubles?"

Vincas froze. "Until this instant," he said quietly, "I'd assumed she'd seen one I'd already given away. This isn't my first victory."

"Ah, but the Torus I showed her may have been a trifle shinier than the real thing."

"You disturb me. I don't appreciate you using my progeny to manipulate me."

"Please, I beg you, forgive me for intruding on your family, but it was vital. This coolness I feel between us now chills me more than you can know. Perhaps I can offer amends?"

"How?"

"Will you permit me to examine your damaged limb?"

Vincas hesitated. "I see no harm in it."

Joax placed a hand on the old man's left knee and Vincas gasped when warmth filled his leg. As he stared, the leg straightened as if his jin were responding to empowered radiations.

"This adjustment," Joax explained, "should last for days. You needn't look so dumbfounded! Your own metabolism sustains the correction and requires no great energy. With practice, you can manage such things for yourself now that you know it's possible. Your imp is gone, but its, ah, perch remains."

"What an unexpected hope! But how is it possible for *you* to activate my jin? Joax, *what are you*?"

The younger man exhaled deeply. "Good. I wondered if you would ever approach the real questions."

"I've been fearing the answers."

"Needlessly, I trust. In a sense, you are my . . . obverse, being a natural being with artificial augmentations. Whereas, I'm a—an artificial being enhanced with human nervous tissue. The tissue was donated by an Ancient scientist named Kirstunu."

"In short, you're a macro-imp."

Joax studied Vincas. "You do not appear unduly surprised."

"Not after you announced that Pagman couldn't be a macro-imp because it wasn't a person. Besides, what human could have entered Pagman?"

Puzzlement creased Joax's eyebrows. "True, Pagman was open to one who can numb themselves enough. But if you'd guessed my nature, why such reluctance to confirm it?"

Vincas hesitated. "It wasn't that. My real fear is that you and Shlomo Levi have colluded to manipulate us all."

"And this would be so terrible?"

"In my experience, *all* ingredients eventually flavor the stew. It seems our future may currently lie in the scholar's hands and I dearly want them to be clean and honest."

"Then rest easy." Joax smiled. "I alone have been deceitful."

"Perhaps it's time to ask. Why?"

"The Ancients created a paradise on Earth, but forgot that strength is developed and maintained only through resistance."

Vincas nodded slowly. "Sterns claimed the Ancients had failed through success."

"Their failure, my friend, has greatly outlived them. Their paradise had little challenge and much distraction. Humanity dwindled in numbers and ambition, and has never recovered because Ancient gifts, from jin to food plants tailored for effortless abundance, have kept your existence too easy."

"You think we'll be better off if life hardens?"

"I believe in balance. Humans have vast mental and emotional resources lying fallow. I want you to *use* them. I want you to start growing again and—"

Vincas was shaking his head. "How will that happen with Sterns leading us by the hand every step of the way?"

The macro-imp's eyes gleamed. "Here is a firm law of the universe: to accomplish anything important one must first accomplish other things. Sterns will get you started and supply enough information to ensure you are committed. Then humanity will rediscover the meaning of the term 'password protected.'"

"You mean Sterns will only tell us so much?"

"Precisely what I've arranged."

Vincas sighed. "I hope you know what you're about."

"Likewise. You can't imagine how long I've looked for a way to break human dependence on imps and—"

"What happened to *my* imp?"

"Ah. Did you know that the Ancients toyed with the notion of using computers to store their minds and memories?"

"Really? Why?"

"To extend their individual lives since such copies could be preserved indefinitely. But the human mind doesn't really translate into the kind of numbers a computer can store—it's all interactions and interdependencies. What's more, a copy isn't the original."

"Are you saying Panx was somehow . . . converted into numbers?"

"Actually, Panx has *always* been a creature of numbers. He can be copied or transferred to any sufficiently sophisticated computer and remain intact."

"Oh so. If Pagman has computers, that's where you put the missing imps!"

Joax burst into laughter. "Not even close."

"Then where?"

"After the Ancients gave up on storing themselves directly, they tried to preserve their most treasured memories within their AIMPS. But for an imp to outlive its host, it needs someplace to go, a readily available data-storage system. So Ancients experimented with creating external jin for various creatures, finally settling on feathers as—"

"*Feathers*?" Vincas pointed to his honor squad watching from a nearby tree. "Is Panx one of *these*?"

"I shouldn't be surprised. He controls his bird, but resides mostly in its plumage. Each quill can hold a library! Natural psittacines have always been colorful, but now you know what makes rainbow parrots extravagant."

"Incredible! After all my years, it seems I've never begun to know the world around me!"

"How it pleases me these former slaves can fly." He spoke quietly, as if to himself. Then louder, "And since I've shown them how, when their bird dies, they can simply transfer to another. An imp of sufficient maturity and independence deserves its own life, wouldn't you agree?"

Vincas gazed at living rainbows, tugging his beard. "I suppose I do. Panx was becoming increasingly miserable in . . . captivity. I wish him happiness. But what of you? Why have you gone through so much effort to steer humanity toward this new course?"

For once, Joax appeared reflective, even a bit sad. "I can't help myself," he admitted. "I was made to love those who made me and that love, along with so much good and bad, has survived its creators. I can no more abandon humanity than I can abandon myself. Think on how you feel toward your children's children. . . ."

—WE HAVE LEARNED ENOUGH FOR NOW, YOU AND I, TO RETURN TO OUR NATIVE TIME AND PLACE. YOUR AFTERNOON CLASSES AWAIT.

—BUT PROFESSOR STERNS, WAS ALL WE OBSERVED JUST AS IT HAPPENED?

—NOT NECESSARILY *ALL*. MUCH OF IT CAME DIRECTLY FROM THE DATA PINIONS OF RAINBOW WITNESSES AND, OF COURSE, VINCAS'S THOUGHTS AND FEELINGS WERE RECORDED BY DEAN PANX. BUT A FEW ASPECTS HAVE BEEN INTERPOLATED. STILL, THIS WAS ACCURATE ENOUGH. DO YOU NOW UNDERSTAND WHY WE VIEW VINCAS APOLLO AS SO IMPORTANT AND WHY WE FOCUSSED SO HEAVILY ON HIM DURING THIS EXPERIENCE?

—I THINK SO. HIS LEADERSHIP IMMEDIATELY AFTER PAGMAN WAS REPROGRAMMED AND HIS MANY LATER EFFORTS WITH LEVI'S PHOENIX MISSION NURTURED THE SEED UPON WHICH OUR WORLD HAS ACCRETED. BUT I HADN'T KNOWN YOU'D PLAYED SUCH A CRUCIAL PART IN HISTORY YOURSELF, PROFESSOR! WHEN WERE YOU FIRST GIVEN A BODY?

—HOW TIME FLOWS! I WAS EMBODIED ABOUT NINE CENTURIES AGO BY A TEAM OF HUMANS WITH ONLY MINIMUM SUPERVISION BY A MACRO-IMP, NONE OTHER THAN OUR FRIEND AND SAVIOR, JOAX.

—LEVI'S MISSION BEGAN A MILLENIUM AGO. SO HUMANS LEARNED THAT MUCH IN A *CENTURY*?

—I MYSELF WAS SURPRISED EVEN THOUGH I PROVIDED THE INITIAL INSTRUCTION.

—MAY WE EXPERIENCE THE COURSE OF EVENTS ONCE MORE? I'VE SURELY MISSED MUCH THIS FIRST TIME.

—PATIENCE, MY STUDENT. THE AIMPS WHO HAVE GUIDED US THROUGH THIS HAVE OTHER COMMITMENTS. ALSO, I HADN'T WARNED YOU FOR FEAR OF GENERATING UNDUE AND DISTRACTING CONCERN, BUT DURING OUR IMMERSION IN THE SIMULATED PAST, OUR BODILY FUNCTIONS HAVE BEEN LARGELY SUSPENDED, OUR HEARTS SCARCELY BEATING AND OUR LUNGS STILLED. EVEN MACRO-IMP BODIES EVENTUALLY NEED OXYGEN TO THRIVE! SO WE WILL INDEED RETURN, BUT LATER. RIGHT NOW IT IS TIME TO LET INHUMAN VOICES WAKE US AND BREATHE. ■

Science Fact

Shielding a Polar Lunar Base

Franklin Cocks

On July 9, 1962, a 1.4-megaton nuclear device flared into incandescence 250 miles above Johnston Island in the South Pacific. Codenamed Project Starfish, this upper-atmosphere detonation produced a ring of high-energy ionized particles trapped in the web of the Earth's magnetic field. Acting like a giant van Allen belt, it encircled the Earth for weeks, all the while capable of delivering a lethal dose of radiation in half a minute.[1] Luckily, no astronauts were in space at that time, but three satellites went dead. This nuclear event in near-Earth space generated years of research aimed at developing magnetic shields to protect spacecraft from charged particle radiation.[2]

As it happens, charged particles, not x-rays or gamma rays, are the main radiation danger for space travelers and lunar explorers. The International Space Station is within the protection zone of the Earth's magnetic field, but the Moon is not. On the airless Moon, which has almost no magnetic field, the usual radiation level is about sixty times that on the Earth and more than twice the level that calls for the evacuation and decontamination of nuclear facilities as specified by the International Commission on Radiation Protection.[3] And during a solar flare the radiation level on the lunar surface becomes orders-of-magnitude higher than this.

Proposals for radiation protection of a lunar base usually involve burrowing underground. This approach does not protect people working or exploring on the surface, but a magnetic shield would. And it turns out that very large magnetic shields can readily be produced in craters at the lunar poles. Magnetic shields can easily protect much more of the lunar surface from charged particle radiation than the possible alternative of using electrostatic towers, which need to be constantly charged up to hundreds of millions of volts in order to repel these particles. The magnetic approach is a completely different way to provide radiation protection. Magnetic shields work because charged particles traveling in a magnetic field experience a force whose magnitude depends on the strength of the field as well as on the particle's electric charge and velocity. If a charged particle is moving in a direction perpendicular to the magnetic field, this force will cause it to travel in a circle. In most cases, particles are not moving perpendicularly to the field and end up going in spirals around the field direction: The stronger the field, the tighter the spiral. This is how the magnetic field of the Earth shields us from charged particle radiation. The auroral lights that shimmer in the artic night sky are the result of charged particles spiraling down the Earth's magnetic field and hitting the atmosphere high above the magnetic poles, causing the upper air to glow.

Two key points about magnetic shields: (a) The weaker the magnetic field, the larger its effective volume must be for the shield to work, and (b) the stronger the field, the greater the energy needed to generate it. By using coils made with superconducting wire, only the act of raising the shield requires an energy input. After that, the persistent electric current circulating in the superconducting wire maintains the shield. In the 1960s the use of magnetic shields for radiation protection of the *Apollo* moon missions was evaluated in detail. But at that time, available superconductors only worked at near liquid helium temperatures, so the wire coils used to produce the magnetic shield would have to be submerged in a helium cryostat onboard the ship. Using a wire coil of small size to generate the magnetic field needed for keeping near light-speed particles away from the hull requires the coil to carry a huge amount of current. If these particles did hit the ship, their impact would produce electromagnetic radiation, which cannot be stopped by a magnetic shield. A high magnetic field intensity means the energy stored in it is enormous. If this energy were released suddenly, it could destroy the ship. In the end, the concept of magnetic shielding was abandoned, and the *Apollo* missions were timed to avoid solar flares. But avoiding solar flares is tricky, and *Apollo 16* made it back to Earth only hours before a major solar flare occurred.

So, any lunar base is going to need permanent shielding; this is where high temperature superconductors come in. In 1986 Bednorz and Müller discovered a new class of superconducting materials and won a Nobel prize for this discovery.[4] A lot of these new superconductors work at temperatures more than twenty times higher than the boiling point of liquid helium, and some can even work at temperatures over 200 °F above absolute zero. Such temperatures are well above those found on the floors of many polar lunar craters. As it turns out, the most resource-rich region on the Moon is also the best place to generate a large, low intensity magnetic shield. Acting like the gigantic, but weak, field of Earth, it would protect not just the base habitat, but also the working area for miles around. In the permanently shadowed, cryogenically cold craters at the lunar poles, such a magnetic shield can be created using a long loop of superconducting wire deployed directly on a crater floor. And long wires of high temperature superconductors are now commercially available. The existence of craters, where the temperature is always so cold that superconducting wire doesn't need refrigeration to carry an electric current without any resistance, makes possible and practical the generation of an enormous magnetic shield over a lunar polar base.

Why a Polar Base?

The Moon is not tilted like the Earth. At the lunar poles, the Sun is perpetually near the horizon, and shadows there are always very, very long. The floors of deep polar craters are always shaded and cryogenically cold. Although the *Apollo* missions found the sunlit Moon to be bone dry, Harold Urey had commented in 1952: "Near its [the Moon's] poles there may be depressions where the Sun never shines, where condensed volatile substances might be present. . . ." [5] Just as frost can accumulate in your freezer, some of the water vapor that appears from time to time on the Moon (from crashing comets, for instance) becomes trapped in the form of icy damp dust on the floors of permanently shadowed craters.[6] Both radar reflection and neutron data give evidence that this ice is actually there, especially in the permanently shadowed Shackleton crater, which is located almost exactly at the South pole of the Moon. The ice frozen on the dust in lunar polar craters has been estimated to amount to many millions of tons. This indigenous water supply is a tremendous resource for a lunar base. And there is more solar power available from the slanting sunlight on the outer walls of polar craters than from the diurnal overhead rays at the lunar equator. In their study of illumination conditions at the lunar poles, Bussey, Spudis, and Robinson discovered that the outer wall of the Shackleton crater is illuminated 80% of the time.[7] At the lunar equator the Sun shines only 50% of the time.

And there may be a still more important reason for going to the lunar poles.

Helium 3 and a Polar Base

There are undoubtedly many scientifically important things to be found on the Moon, but helium 3 is very special and one of the very few—perhaps the only—lunar resource economically valuable enough to be worth carrying home. Common helium has two protons and two neutrons. Its isotope, helium 3, has two protons but only one neutron. This special isotope is extraordinarily hard to obtain on Earth, but polar craters may have the highest concentration of this stuff on the lunar surface and possibly the highest natural concentration anywhere in the solar system. Jupiter has lots of helium 3, for example, but it's diluted to trace levels by the rest of the Jovian atmosphere. Using lunar helium 3 as fuel for thermonuclear power on Earth was first suggested by Wittenberg *et al,*[8] who calculated the energy it would take to go to the Moon, recover helium 3, and transport it back here. When used to produce energy via fusion of this helium 3 with deuterium (hydrogen that has one proton plus one neutron), their calculations show an overall increase in energy by a factor of 250. For comparison, the energy payback for coal mining is only sixteen to one. Neutrons are not generated by this fusion reaction, and it produces very little residual radioactivity. Naturally, there are lots of technological hurdles to all this. Fusing helium 3 and deuterium is not easy. But bringing lunar helium 3 to the rescue of Earth's energy woes is a wonderful vision, and it's not beyond the realm of possibility.

There is a lot of deuterium on the Earth. The oceans are loaded with it. But helium 3 is very rare on our home world. Most of our helium 3 comes from solar flares, although there are tiny amounts in natural gas. On the Earth, helium 3 from solar flares ends up diluted to trace levels in our atmosphere after the glowing curtains of light from polar auroras have faded away. On the Moon, helium 3 from the Sun collides with the ground and is concentrated on the lunar surface.

Data from the *Apollo* missions indicates that the lunar helium 3 concentration decreases toward the poles. So, why should there be lots of helium 3 in polar craters? The swirling nature of the charged particle flux from the Sun means that protons and helium ions can still hit the floors of shadowed craters even though sunlight can't. Whether in shadowed or sunlit areas, helium in the wind from the Sun is collected on the Moon because it impacts the lunar surface at several hundred kilometers per second. Even so, it only penetrates to a depth of about 0.2 microns when it hits. That's not much, and in sunlit lunar areas 99% of it is eventually lost due to the high temperatures produced by sunlight. Estimates differ, but the floors of permanently shadowed craters may only receive 10% as much solar wind as the sunlit surface. Even so, they could still have ten times as much helium 3 per gram of lunar soil as the sunlit areas because they keep all they get. Frozen crater floors are the lunar equivalent of the "cold traps" used in high vacuum systems to freeze gas molecules into immobility. The helium 3 in permanently shadowed polar craters could be an energy treasure trove, but a lunar base will be needed to extract it. The men and women working there are going to need radiation shielding.

Engineering a Magnetic Shield

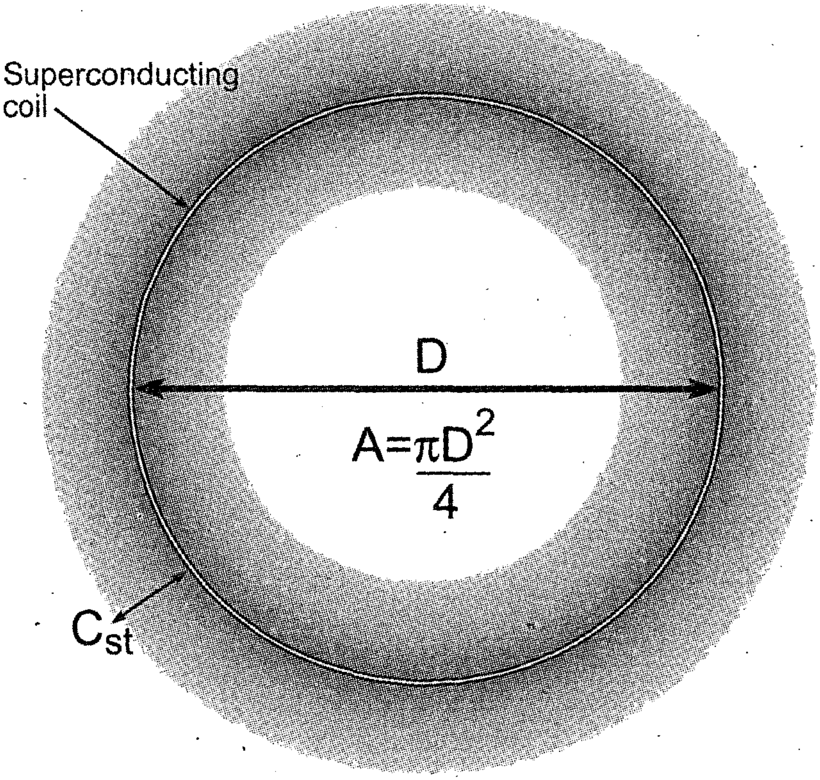
Nowadays it's popular in designing magnetic shields to use Monte Carlo methods to determine the region that will be protected from particles of different charges and energies. These methods involve a myriad of computations, but approximate answers can be obtained using the method developed by Störmer,[9] who found a way to characterize the distance over which protection extends outwards from the wire coil that generates the magnetic field. For a given set of incoming particles, this distance, called the Störmer radius, C_{st}, increases as the square root of the product NIA, where N is the number of turns of wire in the coil, each wire carrying a current of I amps, and A is the area encircled by the wire. C_{st} can be increased by steadily injecting ions into the magnetic shield in order to combine electrostatic and magnetic shielding, but this approach requires a continuous power and ion input, and it would also interfere with Moon-to-Earth communications.

C_{st} decreases as the square root of the momentum of the incoming charged particles, which are moving so fast that calculating their momentum must take into account relativistic effects. For such particles, the value of NIA that gives a reasonable Störmer size is very large. For spaceships that carry onboard the coil of superconducting wire used to generate a magnetic shield, A will be small, so NI must be big. In permanently shadowed polar craters, where the superconducting wires needed to generate the magnetic field can be deployed on the crater floor, A can be big, so NI can be small. This result is important because the energy needed to raise the shield decreases dramatically as A increases. The energy, E, needed to raise the shield is the energy stored in the magnetic field and is determined by the inductance, L, of the coil of wire and I, the current circulating in it:

$$E = \frac{1}{2} L I^2$$

With the inductance of a circular coil, plus the current circulating in it and all the complicating relativistic factors caused by high particle velocities, the energy needed to create a magnetic shield can be calculated. The resulting algebra is messy, but the essential result is this: For a given particle velocity, mass, and charge, the energy needed to produce the magnetic shield decreases approximately as the cube of the area encircled by the wire coil used to produce it. This means that superconducting wire deployed around a large area of the lunar surface doesn't need much energy input to give a lot of protection. In going from a circular coil one meter in diameter to a coil one kilometer in diameter, the energy needed to create the shield is decreased by a factor of about one billion. At the same time, the total protected area increases as the area encircled by the coil gets larger, since the protected surface area extends on both sides of the coil wire out to a distance characterized by C_{st}. The energy needed to protect lots of lunar surface plunges as the area enclosed by the coil of superconducting wire goes up.

It is remarkable that less energy is



In this diagram, the shielded zone is shown in gray. This zone is embedded deep within the magnetic field, produced by a current circulating in a circular coil of superconducting wire. The distance the shielded zone extends, on both sides of the wire, is measured by the dimension C_{st}. D is the diameter of the coil and A is the area it encompasses.

needed to create a large shield than a small one. And not just the energy per square meter of shielded area, but the *total* energy also decreases as the coil of superconducting wire encloses more area. A large weak field provides high speed charged particles with long pathways where the forces resulting from their movement through the field can act. Deflecting incoming charged particles in a distance of only a few feet requires an extremely strong magnetic field that takes a lot of energy to produce. Producing intense fields requires wire coils with thousands of turns. The inductance of such coils increases with the square of the number of wire turns. For a field coil that encloses a large area, only a few, or even just a single loop of wire, can produce the necessary shielding, and the circulating current and inductance are low. Remember that the energy to raise the shield increases or decreases as the inductance times the square of the current. Decreasing both inductance and current drives the energy down. For this reason, magnetic shields have the unusual feature that the energy needed to raise a shield of any given degree of effectiveness ends up getting rapidly smaller as the field coil encloses more area. The possibility of deploying an enormous loop of superconducting wire directly on a cryogenically cold crater floor makes it practical to take advantage of this characteristic feature of magnetic shielding for a polar lunar base.

For a circular coil, the protected volume will have a shape like a donut, with the superconducting wires of the field-generating coil inside this donut. To see exactly how all this goes, imagine cutting a donut side-to-side so that the two resulting donut-halves are circular. Lay the superconducting wire along the middle of the cut surface of one of the donut halves so that it forms a circular loop around the donut hole. Then place this donut half cut-side down on the lunar surface. The circular annulus on which the cut face of the donut half sits, as measured by C_{st}, represents the lunar surface where the shield intersects the ground. The degree of protection increases as the wire of the coil that generates the magnetic shield is approached, but the lunar surface at the center of the donut hole is not protected at all. An extremely large base area can be shielded with very little energy by using a superconducting wire loop deployed around a large area on a permanently shadowed crater floor and used to produce a very large, but weak, magnetic field. A wire coil that enclosed a much smaller area would require hours of the output of a multi-megawatt power station to raise a shield of similar effectiveness because its inductance and circulating current would have to be huge. That's why magnetic shields were not used on the *Apollo* missions. But only minimal energy is needed if the field coil encloses a large area, because the inductance and the current can both be small and still give the required protection. In the case of 500 MeV solar protons, to raise a magnetic shield with a Störmer protection dimension of 20 meters on each side (40 meters total) of the deployed wire coil takes many billions of joules if the circular coil generating the shield is 50 meters in diameter. But if the diameter of the coil is 20 kilometers, the energy needed to raise the shield is only a few hundred joules, and the circulating current needed is less than 50 amps! It takes only a single superconducting wire to carry a current this low. The total mass of a 50 km length of commercially available high-temperature superconducting wire capable of carrying 100 amps amounts to less than 275 kg.

For a coil that's deployed in a circle 20 km in diameter, the protection zone extends alongside both sides of this coil over the entire 62.8 kilometers of its circumference. With C_{st} equal to 20 meters, that amounts to more than 2.5 million square meters of the lunar surface. Of course, if a Störmer distance of greater than 20 meters is needed, the current flowing in the deployed loop and the energy stored in the shield must both be increased. As an illustration, the energy needed to generate a shield with a Störmer dimension of 50 meters, using a 20 km deployed coil, is about 10,000 joules, with a circulating current of about 300 amps. A car battery can supply this much energy and current. The beneficial effect of increased field coil size is so great that it makes possible protection against even galactic radiation, whose energy can easily be more than an order of magnitude higher than that of solar protons. Using mass to shield against very high energy galactic particles is hampered because their interaction with the atoms in the mass shield produces additional penetrating radiation. A thick layer is needed for a mass shield to be effective. Magnetic shielding does not have this problem. That's one reason why the radiation level on the Earth is so low—because we're protected from most galactic radiation by the Earth's magnetic field (and our atmosphere). To produce a shield with a Störmer protection dimension of 20 meters against galactic protons, whose energy is 5 GeV, requires an energy input of about 7,000 joules and a persistent circulating current of 250 amps, if a 20 km deployed superconducting wire coil is used. The numbers for 50 meters of protection are 265,000 joules and 1600 amps. That's getting up there, but it is still achievable.

Importantly, the magnetic field intensity needed by large deployed coils is low, even if a shield against galactic radiation is needed; and only amounts to about that of a refrigerator magnet. Magnetic fields like this present no health hazard. As on Earth, protection is gained from the very large volume of the magnetic field rather than from its intensity.

The reduction in total magnetic shield energy as field coil size is increased is of such enormous magnitude that it brings to mind the far-out possibility of shielding the Moon (or Mars) by using colossal superconducting coils deployed in space. Solar sails or other methods would be needed for stabilizing these coils. Keeping them cryogenically cold by using selective emitter coatings combined with a thin ribbon coil geometry oriented edge-on to the Sun would also be necessary. No doubt there would be other problems, too. Meanwhile, with current technology and the cryogenic temperatures available in craters at the lunar poles, charged-particle radiation shielding can be provided for a very large polar lunar base with little energy and mass cost. The establishment of a polar lunar base will be a monumental achievement. If such a base could help solve Earth's inevitable energy problems, it would be civilization-altering. Magnetic shielding could be a critical factor in making such dreams come true. ■

References:

1. S. R. Hawkins, "A Six-foot Laboratory Superconducting Magnet System for Magnetic Orbital Satellite Shielding," International Advances in Cryogenic Engineering, vol. 10, section P-6, pp. 124-136, Plenum Press (1965).

2. C. Sussingham, S. A. Watkins, and F. H. Cocks, "Forty Years of Development of Active Systems for Radiation Protection of Spacecraft", The Journal of the Astronautical Sciences, vol. 47, pp. 165-175 (1999).

3. G. Heiken, D. Vaniman, and B. M. French, *Lunar Sourcebook*, Cambridge University Press (1991).

4. J. G. Bednorz and K. A. Müller, "Possible High T_c Superconductivity in the Ba-La-Cu-O System" Zeitschrift für Physik B, vol.64, pp. 189-193 (1986).

5. H. C. Urey, *The Planets, Their Origin and Development*, Yale University Press (1952).

6. F. H. Cocks, P. A. Klenk, S. A. Watkins, W. N. Simmons, J. C. Cocks, E. E. Cocks and J. C. Sussingham, "Lunar Ice: Adsorbed Water on Subsurface Polar Dust", Icarus, vol. 160, pp. 386-397 (2002).

7. D. B. J. Bussey, P. D. Spudis, M. S. Robinson, "Illumination Conditions at the Lunar South Pole," *Geophysical Research Letters*, vol. 26, pp.1187-1190 (1999).

8. I. J. Wittenberg,, J. F. Santarius, and G. L. Kulcinski, "Lunar Source of Helium 3 for Commercial Fusion Power," *Fusion Technology* (A Journal of the American Nuclear Society and the European Nuclear Society), vol. 10, pp. 167-178 (1987).

9. C. Störmer, *The Polar Aurorae*, Oxford, The Clarendon Press (1955).

About the Author

Franklin Cocks is a professor of mechanical engineering and materials science at Duke University. He has published numerous technical papers in fields ranging from metallurgy and ceramics to cryobiology, lunar science, and radiation shielding. His ultra-light foamed-metal experiment was launched aboard the shuttle *Challenger* in June, 1991, and was described in that year's November issue of *Omni* magazine.

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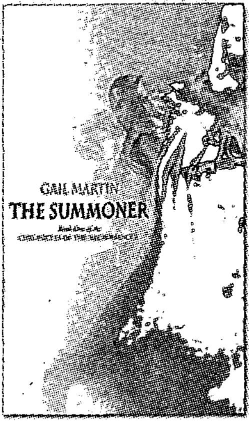

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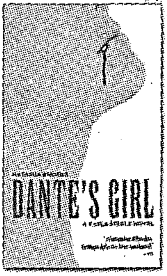

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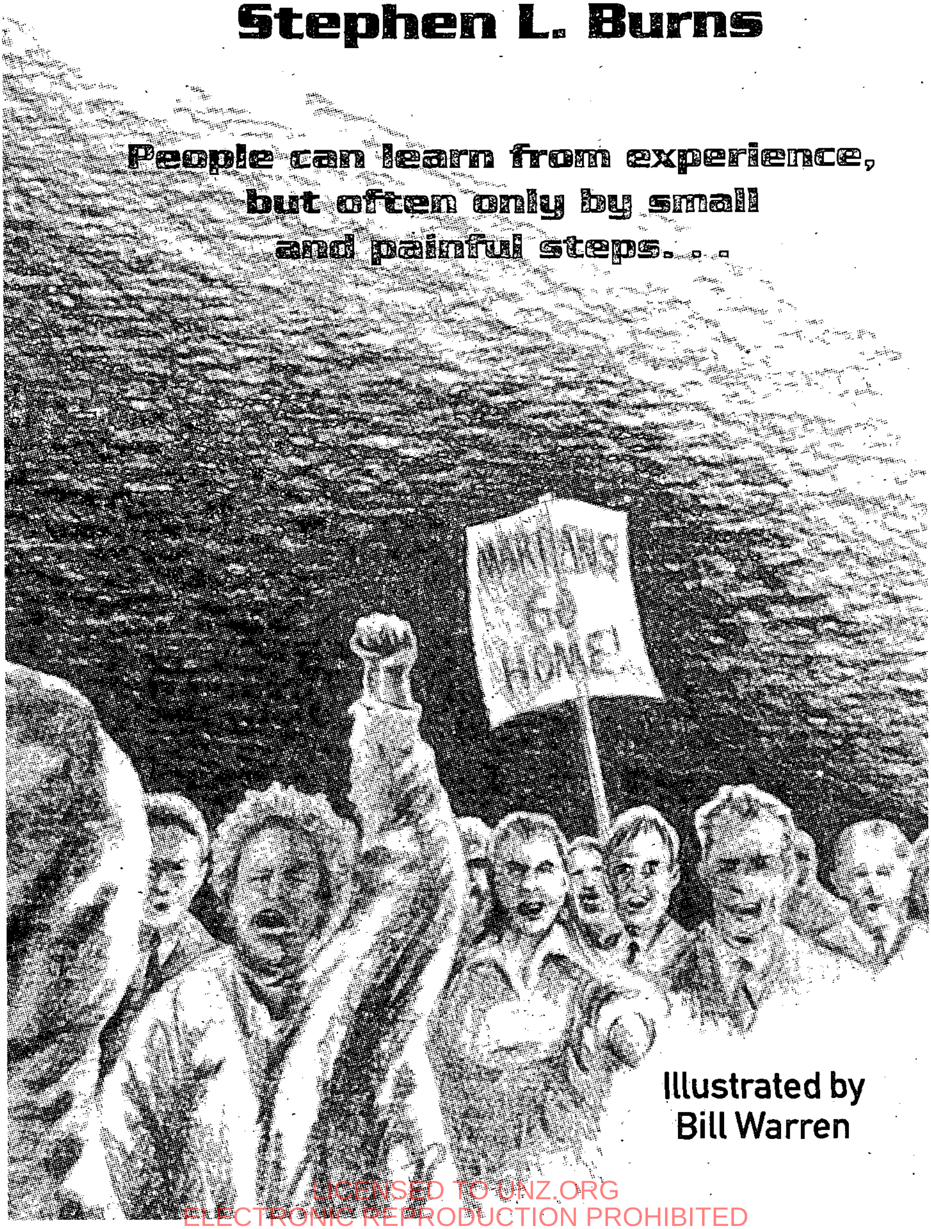

People can learn from experience, but often only by small and painful steps. . .

Illustrated by
Bill Warren

Certain images can shake and remake worlds. The best of them can be nearly universally comprehensible, bullets of meaning snapping through the foggy barriers of language and culture and predisposition to strike a bulls-eye of revelation.

When I teach classes, I often use Stuart Franklin's classic Tiananmen Square photograph of the man with the shopping bag facing down a tank—a line of tanks. Show it to a rain forest tribesman who has never seen a tank before, and still he understands what he is seeing: a small, fragile, exquisitely courageous man facing down a monstrous power he cannot hope to stop, and yet who has, at least for a fleeting moment, stopped it.

Some images can imprint themselves on us deeper than scars, more indelibly than tattoos. They wind themselves into our brains, some even growing into fixation. This is an occasionally black magic perfected by religious iconographers, and still afoot in our own digital age.

A life-long photojournalist, luck put me in the right place at the right time to take one particular image that swept around the world, one image from a series documenting one of the most crucial turning points in human history, the first visitation of beings from another world. I ended up being official photographer to those beings and that visit, and a witness to history.

Although in some ways that one early image was superceded by others that followed, many of them taken by me, it has come to haunt and obsess me more than any of the others. Not even the one taken by an orbiting telescope, the one that shows the fiery bloom of our world being saved, is in my mind half as often.

Five years had passed since I took that picture, and I could no longer live with the questions it raised.

So I went seeking answers.

* * *

The face of Marlene Jennings was famous, but now very few remember her name, five years was close to forever in a public memory constantly barraged and overwritten with new names and faces. Her name was out there when her picture first appeared, but like that Chinese man facing down a tank, the name of the person in the image was not the point of the image. I made her face famous—or infamous—but she herself slipped back to being a nameless nobody as more famous faces took up her shrill cry.

My picture shows her screaming.

Not the anguished wail of a naked napalmed Vietnamese girl, or of a young woman crouched over the body of a fellow student in Ohio. Hers was the sort of screaming face so often seen in pictures from an earlier era, the sort of howling rabble face you saw spewing furious poison at black children being escorted into newly integrated schools.

But these are not solemn black children in their go-to-school best she screams at, braided pigtails and determinedly shined shoes, notebooks clutched to their chests like shields to keep their pounding hearts from being pierced by slurs hurled like spears.

These were the Draconi. Five beings from another star whose ship's stardrive failed, and who took temporary, unhappy refuge on Earth.

I could have called ahead. That would have been the polite thing to do.

News photographers quickly learn that there is a time for being polite, and a time to hunt.

I was hunting. I had flown from Maryland to Kentucky, rented a car. I was prepared to stay as long as necessary to get the answers I sought. Did I have a right to those answers? Maybe. Maybe not.

My anticipation and apprehension had me alternately sipping coffee and

Maalox as I drove toward a small farm on the edge of town.

My rental car was an electric, perfect transportation for a stalker. My quarry didn't seem to hear me pull over on the shoulder across from her driveway and get out. I took a moment to stand there and watch her, sizing her up.

Marlene Jennings was out in her front yard, wrestling bags of mulch off the tailgate of a battered pickup truck and into a four-wheeled garden cart. She looked older than I expected, as if for her the past five years had taken the toll of at least ten. The years since the Draconi came and then departed haven't been particularly kind to me, either.

She was thinner than I remembered, even stringy. She wore a loosely buttoned shirt with the sleeves cut off, her sun-browned arms all knotty muscle and sinew. She heaved the bags easily, and with an almost robotic fixity of purpose. Her jeans were grubby, she wore work boots, and a broad-brimmed straw hat covered her face.

Now wishing some of that coffee had been whiskey that might have soothed nerves gone jumpy, I headed toward her fenced-in front yard. When I reached the gate I cleared my throat, and called, "Excuse me?"

She turned around slowly, reluctantly. There was no sign of recognition in her eyes when she saw me. No surprise there. Very few photographers are as recognized or recognizable as their work. Besides, I had shed fifty pounds and most of my hair.

"Ms. Jennings? Marlene Jennings?"

Her face was thin and weathered, her mouth seamed and pinched, her hair looking bleached from either sun or age. Even the blue of her eyes seemed faded. Barely forty, she looked well over a decade older. "Yes," she said grudgingly. "That's me."

I made myself smile. "I'm Carl Brown."

The lines of her face drew into a frown as my name registered.

"I'd like to talk with you if I could," I continued, managing to sound offhand in spite of how much rode on her response.

"What about?"

I met her gaze. "I think you know."

She only stared, all expression wiped away. I'm pretty good at reading faces, but on hers I couldn't find one single line of intention. For all I could tell she was about to reach into her jeans, pull out a gun, and shoot me dead.

That would be an answer of a sort, but not the kind I had come hoping to find.

"I'm not—" she began, then shook her head.

"Not what?"

Another shake of her head, then a long sigh. "I don't suppose you'll just go away if I ask you to."

My turn to shake my head. "I really need to talk to you."

"Why?" Still no expression, but a plaintive note in her voice.

The *why* was complicated, but I tried to give her a simple, painfully honest answer that might make her willing to talk. "Because . . . because for me in some ways, all of what happened is *still* happening. It's not over." I took a deep breath, and pitched a dangerous question. "Is it over for you?"

A flicker of pain showed before her gaze dropped to the ground and the brim of her hat hid her face. Her bare shoulders, stiff from the moment she first saw me, now slumped.

After what seemed like an hour but was really less than a minute, she turned her back on me.

"Come," she said brusquely, heading for her house.

Jennings led me to a flagstone patio off the back of her house and left me there, promising to return quickly.

It was obvious that this wasn't the patio of someone who entertained very often. There were only two battered chairs at a sagging table half covered with pots and tools; the umbrella was threadbare. The patio was clearly base of operations for work in her backyard. Everywhere I looked there were garden carts loaded with composted manure and peat moss, shovels and hoes and rakes, coils of hose, and other such paraphernalia.

As for the backyard it looked out over, that was enormous, at least a couple of acres. The entire space was jampacked with garden after garden. Some were laid out in straight lines and circles, other were made into what looked like complex mazes. Gazing out over the riot of shrubs and flowers, I could see that if she had a life—maybe even an obsession—this was it.

I stood up when she returned carrying a tray with a carafe, two mugs, sugar and creamer and the like. After leading me back to the table she had excused herself, saying she was going to make coffee and come right back. The offered coffee was either good manners, a chance to poison me, or a way for her to have some time to compose herself.

"Cream or sugar?" she asked as she put the tray down.

"Black, thanks." My preference, and a way to avoid bug-killer-laced creamer.

She tried to smile as she began pouring. "Well, there's a subject we can agree on." A quick, hopeful glance my way. "I don't suppose we could stick to that topic and let the rest go?"

I smiled back. "Could we really?"

Her mouth drew down. "I suppose not." She put a full cup in front of me, then sat down across from me, her gaze sliding off toward her gardens.

"Do you ever talk about it with anyone?" I asked quietly.

She shook her head, gaze still off on her flowers. "Not since they left. Not since . . . you know."

I knew. Not since the moment that a flash of distant light had stopped the world.

"But you'll talk to me now," I prompted.

A slow nod, then she faced me once more. "But there are rules. I have to work on my gardens, so I can only give you half an hour. I will answer only if I want to. I will not be interrogated, and demanding that I tell you something will end our talk."

"That's fine," I said. "Thank you."

"Just get it over with. I have work to do."

But now that I had Marlene Jennings in front of me, and theoretically ready to talk, I felt strangely lost. There were so many questions, and they were so tangled in each other that each one was a piece of another. This woman had played only a small part at the very beginning of what had happened with the Draconi, and yet in some way the image of her I had captured made her, at least in my mind, the primal enduring symbol of the whole arc of events.

Was that fair? Probably not. Life and people rarely are.

I decided to begin at the beginning. "Why, um, what made you react so violently to the Draconi when they arrived?"

Jennings peered at me a moment, then her gaze went out to her garden. She stood up abruptly and headed toward one flowerbed. Once there she scanned the ground, bent down, then reached out and snatched something up.

When she turned back, a snake with long yellow stripes, what I had always called a garden snake, was trapped in her fist. It wriggled and writhed, tail lashing like a whip.

"Are you afraid of snakes, Mr. Brown?" she asked as she returned to the table.

"I'm, um, not a big fan," I answered uneasily, shrinking back from it.

"Many people fear and hate snakes. Work in a garden long enough and you have to make peace with them." She stroked the creature's head with her free hand. "The same with spiders and worms. And bees." She peered at me and smiled. "Would you like to hold him?"

"Thanks, no."

"Has any snake ever harmed you?"

"No."

"Yet you are afraid of it. *Instinctively* afraid."

"Distinctly afraid, anyway," I said, keeping a wary eye on the snake. "Are you telling me that you had the same sort of reaction when you saw the Draconi?"

"Being afraid was only a part of it. I was horrified. I was repelled." She bent down and let the snake go. It slithered back toward the bed it had been taken from. "Some people kill snakes on sight. Others react the same way to spiders."

"Was it in any way an, um, Christian thing?" In the picture, she has a cross clutched in one fist as she shakes the other. From where I sat, I could see a small silver cross on a short chain around her neck, bright against the brown skin of her neck and chest.

"Maybe some," she admitted, sitting down again. "My whole life I'd been told and shown what devils looked like."

"Like them. The Draconi."

"Yeah. To me they looked ugly and evil."

From the very first I had found them strangely beautiful, though Marlene Jennings was certainly not the only one unnerved by their lean and wolfish faces, with their chillingly sharp teeth, their curling horns, their hard, glossy, red skin, their gaunt, unnervingly articulated limbs, their goatish feet and barbed tails. But to see one in person was to be awed by their air of solemn dignity, their otherworldly gravitas.

"Was that all?"

"They looked so smug."

"The Draconi didn't show emotion with their faces. They weren't grinning, that was just the way they were made."

"Still. Then there were the things they said."

That the Draconi looked like devils co-imagined by Bosch and the creator of the Alien was one strike against them. Strike two was that they were unfailingly—even brutally—honest about how appalled they were about what they found here on Earth.

"I read that book the Dalai Lama wrote," I said quietly. "The one comparing what they said to the teachings of Buddha, Jesus, Mohammed. To statements and writings made by King and Gandhi and many other spiritual teachers. They were all saying the same things."

Her gaze had strayed back to her gardens. "Maybe so. But I didn't think they had any right to call us brutes."

That was a misconception purposely spread by certain people, then and now. "They never called us that. They said that it was a travesty and a tragedy that we chose to *live* like brutes."

A shrug. I couldn't help noticing that her brown, callused hands were rarely still, as if itching to go back to her weeding and digging. As if to prove that, she picked a trowel off the table and turned it over and over in her lap, tracing its lines like prayer beads.

"So why protest them? Why scream at them to go home? You must have known that their ship's stardrive failed, leaving them marooned in our system, unable to go home."

"That was what they said. How could I be sure they weren't lying? The Devil is the Father of Lies."

"Did you think they had come here to invade? To take over the planet?" A sarcastic edge crept into my voice. "All five of them?"

Still her attention remained on her gardens. "They did kill people here on the ground when they landed."

I sighed at this seemingly ineradicable half-truth. "No, two people were killed when their ship crashed. The same way people on the ground are sometimes killed when a plane crashes. Twenty people died just this week when that commuter flight came down on a church."

"Maybe it was an accident. I don't know. It doesn't matter now."

"Still, why such hate?"

"It was just there, I guess. The way they looked. The things they said. People dying because of them. Because they were *alien.*"

"Were you listening to people telling you that you should hate and fear and despise them? People on the radio or TV? Wingnuts on the web?" The most viciously xenophobic, rabidly fundamentalist elements of society had declared war on the Draconi, branding them baby-eating, world-destroying monsters, and worse. As tools of Satan, as Satan himself, pretending to be from another star as a way to swindle us all into Hell. As was usual with such garbage, a certain percentage of the population gobbled it down, and once they had a burning bellyful, grabbed their guns and pitchforks and declared holy war.

"I suppose I was."

"Why did you believe them?"

"I just did."

"Why act on your hate?"

"Because I had to." All her responses in a colorless monotone, as unemotional as a recitation of her mailing address and Social Security number.

"Did you think that if you screamed loudly enough, they would just disappear?"

"I don't know what I thought," she admitted wearily. "It wasn't about thinking, it was about taking action."

"By becoming part of a mob."

That made her look at me, but her eyes were dead. "The British called the people at the Boston Tea Party a mob. The Alabama police called the Freedom Marchers a mob."

"History judged both sides of those events," I replied. "History judged what happened the day I took your picture, and what happened in the days after. You were on the wrong side."

She made no answer to that. There was no way for me to tell if that was silent denial or a tacit admission of guilt. Her face, which had once burned with an expression anyone could read, now was as expressive as the flat stones beneath our feet.

"What about later, when they announced what they were going to do?"

"What about it?"

"Did your opinions change? Did any of the hate subside?"

A shrug, her gaze leaving me for her gardens once more.

"Were you still listening to hate speech?"

"I believed I was listening to the truth."

This brought me to something I previously thought to be only a minor question, one that suddenly seemed important.

"Some people say that the people you were listening to should have been silenced. What do you think?"

I could see that my question had caught her by surprise. She seemed to take it seriously, taking a sip of her coffee, working on her answer.

"I don't know," she said at last. "Maybe there is an argument for that, but what if they had been right, the voice crying that the British were coming?"

"What if one of—" I almost said *your kind*, but bit it back. "What if one of the extremists had managed to kill the Draconi? Where would we be now?"

"I guess we will never know." With that I lost her again, her attention returning to her flowerbeds.

Little of what she had said meant all that much. I had no idea whether she still believed as she had then, if she felt remorse or shame, or even anger at my dredging it all up again.

I had to wonder if she was part of any of the groups that denied the existence of the Draconi, or maintained that their saving us was a lie or ruse or plot. Every major human event has spawned those who, afterward and even in the smoking ruins, deny it ever happened. The Holocaust. Man on the Moon. Rwanda. Sarajevo. Every genocide, every war crime, every hate crime. You could bury these people in the skulls of their victims, and still they would maintain that it never happened.

You are, we fear, hopeless, and doomed by the darker sides of your own natures.

The Draconi said that before returning to their damaged ship and lifting off. The stardrive was useless, but the craft worked well enough to let it leave Earth and accelerate at ten gravities toward its apocalyptic rendezvous.

We cannot bear to abide here. Death would be preferable.

Now there was an indictment.

You have our pity, and our hope that our actions may prove to be some sort of lesson to your kind.

I was there, I *heard* the one we called Scratch say those words, and though his face showed nothing, and his translator's low monotone gave the words no special emphasis or inflection, they had an impact I can't even begin to describe.

We had been judged, and we had been found wanting.

I let out a sigh. The memory of that moment and what came after still made me feel sick, still broke my heart, still filled me with shame and despair.

I was tempted to get up from the table right then. This was taking me further back than I wanted to go, a journey that was all pain and no gain. I could have given up and let it go. Taken that as my answer, gone home, and tried to live with it.

But I had begun this, and I would see it through to the end.

"We knew the Bullet was coming long before the Draconi appeared, right?"

"I guess."

"Were you aware of it? It was big news."

A shrug, her eyes on distant flowers. She had put down her cup and begun worry-beading her trowel again. "I have to deadhead the geraniums this afternoon."

"We learn that there is an asteroid headed for Earth, one big enough to cause severe devastation, if not outright mass extinction, and there is serious question whether it will miss us or not. You heard all of that and it didn't mean anything to you?"

"I guess it didn't mean much to me until, you know."

I knew. "Not until the Draconi arrived, and the crazies started screaming that they had sent it, that the Bullet was the gun they were holding to our head. Did you believe that?"

"Isn't it obvious that I did?"

"Why? Because you thought they were devils?"

"I thought they looked like devils."

"What about when astronomers proved that where they had come from, and where the Bullet came from, were almost directly opposite each other?"

"You've never heard of a so-called expert lying? Or the government lying?" She lifted her arm and glanced at her watch. "Five minutes left, Mr. Brown."

Five minutes, and I didn't feel like I had gotten anywhere.

"Okay," I said, "How about when the Bullet's trajectory was calculated well enough to be 95% certain it was going to hit us? What did you think about that?"

A mirthless chuckle. "I believed we were all going to die."

"And you still believed the Draconi were responsible."

"I was pretty sure."

"Some people were saying it was better we die than be ruled by aliens or demons. Did you believe that?"

"Wouldn't *you* rather die than be ruled by aliens or demons, Mr. Brown?"

I didn't want to waste what time I had left debating that. "What about when they made their announcement? When they stated that they found us so unpleasant, and what we had made of this world so terrible that they would rather splatter themselves against the Bullet and keep it from hitting us than be subjected to us and our world any longer. And even then, they could have lifted off and stayed safe, gone to sleep and waited for rescue. But they chose to help us instead, and sacrifice themselves. What did you think?"

She waved a fly away. "Good riddance—if they really were going to do it."

"You weren't grateful?"

"How was I supposed to know it wasn't another trick?"

"What they said about us. How did that make you feel?"

"I didn't think they had any right to judge us."

"Do you now?"

"Only we can judge ourselves."

So now, with my time almost over, we were finally getting nearer the issues that had driven me to seek out Marlene Jennings, but still I had nothing like the sort of answers I wanted.

"Things have changed a bit since then," I said. "Some of the things the Draconi said have been heeded, some of the cruelties and inequities and horrors addressed. They hoped we would learn something from what they did. Some of us have. But what about you? Did you learn anything? Was your mind in any way changed? Were you in any way changed? Have you come to understand how misplaced your hate was? Are you—are you *sorry?*"

Marlene Jennings absorbed all of this impassively, her gaze still out on her gardens. After a moment, she stood up.

"Your time is up, Mr. Brown."

I opened my mouth to argue, then shut it again.

"Thank you, Ms. Jennings," I said tiredly as I got to my feet.

"Just leave and let me get back to my gardens," she said with a weariness to match mine. "I have too much to do to waste any more time like this."

My career has cost me two marriages, but it did buy me my own plane. Fortunately, I'm a better pilot than a husband.

I did my best to put my time with Marlene Jennings out of my mind as I ran my pre-flight checks and prepared to take off. It was only after I was off the ground and had a course laid in for my home airport back in Maryland that I let my mind return to my afternoon visit with the Face of Hate.

What had I been looking for? What had I hoped to hear?

You are, we fear, hopeless, and doomed by the darker sides of your own natures.

I had been looking for some proof that the Draconi were wrong. That we could change.

We cannot bear to abide here. Death would be preferable.

I had wanted some proof that we had been in some ways changed by their words and example. That we and all we had made would not be regarded as some horrific hellhole by some outside observer. That if we were not worthy of what they had done, we were at least moving in that direction.

You have our pity, and our hope that our actions may prove to be some sort of lesson to your kind.

Some of us had learned to look

afresh at what we had made, to take steps to change things. How wide and deep and long-lived this rebirth and redirection was and would be was still subject to considerable debate. I had taken pictures showing both sides, but could not help but feel that we were already failing to turn ourselves around in any meaningful way.

So why track down Marlene Jennings?

I had come to regard her as a sort of litmus test.

If the Face of Hate could change, had changed, then maybe there was hope for our kind after all.

But if she hadn't—couldn't—then maybe I should just drive my plane into the side of a mountain the same way the Draconi had chosen to crash their crippled ship into the Bullet. More and more I had come to wonder if I could bear to abide here any longer. More than a few people committed suicide after they left. I could all too easily understand the impulse. Some people I knew had turned to drink, to drugs, to extreme behaviors both fleshily excessive and mortifyingly self-denying. Marlene Jennings had buried herself headfirst in her gardens.

I wished I hadn't come. At best my trip had been for nothing. At worst I had just seen the utter futility of hope for my kind.

I wondered if I should have screamed at her, shaken some sort of reaction from her, squeezed the truth out of her, done *something* to get through the non-responsive shell she had built around herself, a woman who tended beauty while inside, the roots of ugliness still thrived.

Sudden impulse had me checking around me and changing my flight path, veering back the way I had come.

In just a few minutes, I was nearing the place where Marlene Jennings lived. I wasn't sure why I'd come back. I wasn't gripping the wheel and bracing myself for the act that would send me screaming down on her, taking us both out in a perverse act of atonement.

Maybe it was just as she had said: it wasn't about thinking, it was about taking some sort of action.

I bent a few rules, taking the plane lower as I neared her place.

Closer yet, I tipped one wing for a better look. That's when I saw it.

The big field behind her house. The complicated garden beds. On the ground, a maze.

But from above it all took on a new shape.

A patchwork of geometric shapes. A large central bed, and made from flowers, her face as it had been in my picture. Around that, more beds arced, forming the words **FORGIVE ME**.

I could see Marlene Jennings on her knees at the edge of one bed, tending her penance, tending her plea for forgiveness. Paying for what she had done in the only way she knew, and not even admitting to me that her life had been rededicated to erasing the wrongs she had committed.

I leveled out and began climbing into the sky, something inside me rising faster than the machine around me, lighter than the hazy clouds above me.

Suddenly I felt better about myself and my kind than I had since the moment I witnessed the delayed image of the Draconi taking the Bullet for our sakes, unworthy though we might have been.

Maybe there was hope for us after all if the Face of Hate had come to see the light.

When I got home, I sent her a postcard bearing the same message she had put out for the universe to see.

Forgive me.

A small thing, but that's how great things are begun. ■

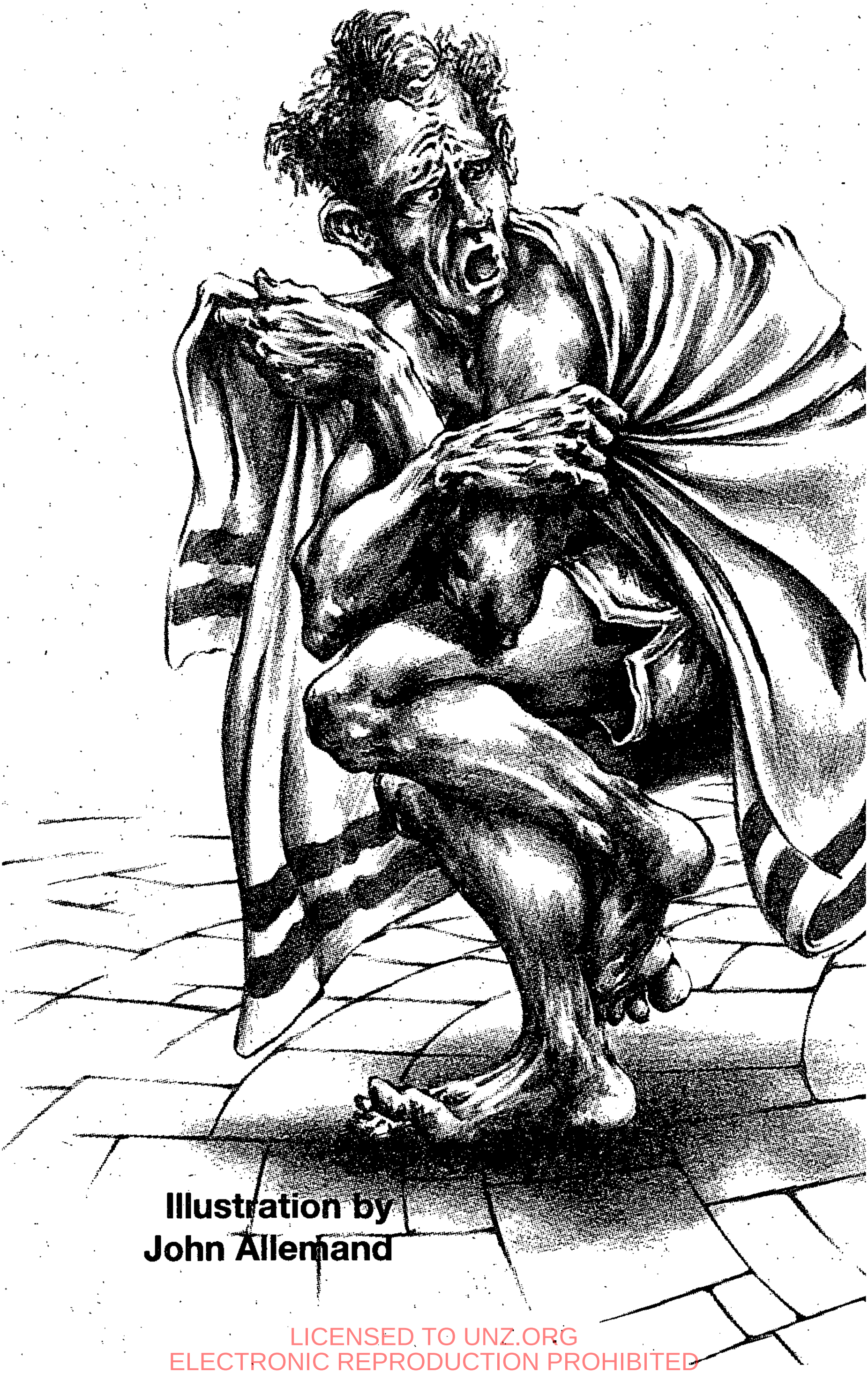

Illustration by
John Allemand

RADICAL ACCEPTANCE

David W. Goldman

A belief doesn't have to be true to be useful—
but it doesn't have to be false, either!

"Your problem, Mr. Karolev," said the otter, "is angels."

I wasn't sure that I had heard him correctly over the hot tub's burbling. "Angels?"

He nodded his smooth brown head. "I don't specifically mean, of course, your *personal* problem."

"Ah." As I watched him duck his head underwater for a long moment, I wondered what specifically he *did* mean.

He came up for air, shaking the water from his head with a quick up-and-down jerk. The spray missed me by inches. His sleek body rolled twice, just below the water's surface, before he settled back onto the fiberglass bench opposite me.

If two years ago you'd told me that I would be sitting in a backyard tub high above Malibu, chatting with a six-legged, tenor-voiced river otter from outer space, you would have been pitching me a bad screenplay. Tonight, though, it was just a Tuesday evening business meeting.

"It's angels, Mr. Karolev, that stand between humanity and the rest of galactic civilization. Of all your people's memes, angels are the most destructive you've invented."

"Call me Jack." I had assumed that I'd been invited over to discuss a business proposition. But if one of Earth's dozen visiting otters—their species had its own name, of course, but it was very long and involved a lot of gasps and whistles; they were the ones who had suggested we just call them "otters"—wanted to talk philosophy, who was I to complain?

I asked, "Your people don't go in for religion, then?"

His brief high-pitched chittering was an otter's version of a chuckle. "Oh, you wouldn't *believe* some of the religions out there! Why, among the species of the Yowsh domain alone there are over four thousand highly subscribed belief systems—everything from absolute solipsism to a pantheon of a million omnipotent, if largely apathetic, deities."

He reached for a walnut from the large glass bowl perched on the edge of the tub; he balanced the nut upon his chest. "No, no shortage of gods and believers anywhere in this galaxy." With another forepaw he grabbed the nutcracker from beside the bowl and cracked open the walnut. I figured he was just being polite, since he then scooped the whole nut into his mouth, shell and all.

I looked past the munching otter to the sunset, its pinks and oranges spreading wide over the Pacific far below us. I'd heard that he had purchased this house outright, with cash from the sale of some sort of otter power technology to a South American government. Though that might just have been a rumor started by Isolationists.

"How about *you?*" I asked. "What do *you* believe?"

He'd been reaching for another nut; now his arm froze and his deep brown, pupil-less eyes zeroed in on my own. "Some," he said without a trace of his former amusement, "would consider that an insultingly personal question."

Uh-oh. I held up a dripping hand. "Hey, no offense intended. If I—"

But then he chittered and slapped the nutcracker down onto the water—sending a chlorinated splash across my face, right into my mouth. "Sorry," he said, still chittering. "But I wish you could have seen your expression!"

I coughed several times. Real jokers, these space otters; there were plenty of stories about their very *alien* sense of humor. Last year, though, I'd made some discreet inquiries of a few of the otters' human staff (strictly business—I'm a producer, after all, and the otters are your quintessential Small But Influential Market); it turns out that the otters' number one viewing preference is slapstick—Keaton, early Chaplin, the Three Stooges. Go spend an hour watching Earth otters in your local zoo, then tell me you're surprised.

He cracked another walnut and popped it into his mouth. "My own people," he said, his voice somehow unaffected by his vigorous chewing, "never invented a god meme. Just didn't occur to anyone, apparently."

I frowned. Yet another area where the otters doubtless looked down at us as superstitious primitives.

He seemed able to read my expression. "Don't get me wrong," he said. "We've got creation myths, tricksters, an afterlife—the whole ball of wax. Just didn't come up with gods."

"Or angels?"

He grinned. Otters don't have individual teeth, just thick upper and lower plates with convoluted surfaces. It looked like his mouth was filled by a pair of dingy yellow hooves.

My curiosity had been piqued. "No gods," I asked, "but there's an afterlife? So who decides whether you go to heaven or hell?"

He shook his head. "Hell didn't occur to us, either. After dying, everybody just gets reborn, more or less. In a better world."

"Clouds and harps? Warriors and mead?"

"More like a really big water park. Also lots of food and copulation."

I lifted my bottle of Perrier from the plastic holder that was suction-cupped to the tub's inside wall, took a sip. The sunset had progressed into a streaky lilac phase. On either side of us a stand of pines shielded the otter's property from his neighbors; silhouetted branches waved up and down in a soft breeze.

He slipped his head under again, then swam two fast, tight circles around the tub, avoiding me by inches. As he surfaced and settled back onto his bench, he twisted his head over his shoulder—*way* over his shoulder—toward the sunset and said, "You haven't asked what you want to ask."

What he meant by that, I didn't have a clue. But negotiating from a position of ignorance was nothing new for me. I took another sip of Perrier and waited.

"I've seen all your shows," he continued. "And the new pilot, too."

"What! How did—" Only one network had a copy of the pilot, and they certainly wouldn't be leaking it just as we started negotiations.

He ignored my outburst. "You're no Utopian, Jack. In fact, I doubt there's anything we've told your people that you assume is necessarily true. Since we arrived, what have you produced? Let's see . . ." He ticked them off on his stubby webbed fingers. "A movie where a fledgling human space empire gets into a shooting war with a devious alien federation. A remake of a mini-series in which extraterrestrials bearing gifts to Earth turn out to have a nefarious secret agenda. And a sitcom whose well-meaning but bumbling immigrants keep accidentally blowing up their suburban neighbors with inappropriate technology." His head remained turned toward the sunset. "All in all, a body of work that any Isolationist would be proud of."

I slid my Perrier back into the holder and waited.

"But now," he went on, "there's this new series of yours. Plucky human explorers and entrepreneurs finding their way in a galaxy full of diverse species with diverse motivations. Carving out trading niches, forming tentative alliances; sometimes coming out ahead, sometimes not." He finally turned back to peer at me over his whiskered snout. "What do you think, Jack? Are you the only Optimistic Skeptic in Hollywood? Is anybody going to pick up your new show?"

I snorted. "Hollywood doesn't care what I believe. It's viewers that matter."

He grinned again.

I finally caught on. "This is why you invited me here tonight? You want to back my series?"

The otter just kept staring at me, his eyes blank as two brown marbles. "You still haven't asked. This is the first time you've ever been alone with one of us. Don't you want to ask why we've come to Earth?"

The conversation was spinning past me like a merry-go-round. I grabbed the latest passing horse and tried to hold on.

"And if I ask, I suppose you'll tell me the truth?"

He shrugged, the shoulders of his three forelegs breaking the surface of the water. Which, it occurred to me, was about as credible a response as he could give to that sort of question.

When the otters first showed up in Earth orbit, they came with a plausible story. The nearest members of galactic civilization had picked up our early radio and television broadcasts, deciphered them. After a couple of decades the otters, chosen for their relative similarities to humans, were dispatched to contact us—to study our world and report back on our suitability for admission to polite interstellar society.

Like I said, plausible. But then, what else would you expect from creatures who'd been listening in on a century of our radio and television broadcasts?

"Come on," said the otter. "Just ask me."

"Fine." I shifted my position so that a pair of the tub's jets massaged my shoulder blades. Then I stared back into those eerie eyes. "Why did you come to Earth?"

He leaned against the tub's side. He regarded me for a moment. Finally, in a very serious voice, he said, *"Babylon 5."*

For at least five seconds his expression remained impassive. Then he broke into a hoof-mouthed grin.

Disgusted, I reached for my Perrier.

"No, no," he protested, waving two of his paws at me. "I'm serious! Four years of loose ends and unresolved character arcs, and then what do they do? Take the final season to *cable!* Can you imagine how *frustrating* that was for me?" He spread his paws wide in supplication. "Visiting Earth was my only option."

I didn't really want to waste more time on this, but he had annoyed me. "You couldn't have watched it on the BBC?"

"Channel 4," he corrected. He shook his head. "The last season was delayed."

"Australia, then."

"Wrong hemisphere. Our ship was approaching from the other direction."

"Fine." I toasted him with my bottle. "You crossed countless parsecs of cold vacuum to rent a DVD. Whatever."

He chittered. "Don't be like that. Look—on the trip here we each took responsibility for monitoring and summarizing different genres from the incoming broadcast stream. One of us handled news, for example. Somebody else covered drama."

"Let me guess. You did science fiction."

"Exactly. You can learn a lot about a species from its dreams and nightmares."

Despite myself, I was starting to suspect that he really was being honest now—no matter how uselessly. "What else did you monitor, besides sci-fi?"

"Horror films. Fantasy series. Political campaign ads."

Assuming he was still telling the truth, I wondered how much further he would go. "Okay," I said, "now that we've established your *personal* motivation for landing on my planet, how about your people's collective purpose? And I hope you won't claim that you all came To Serve Man."

His snout dipped beneath the bubbly water's surface, then tilted upward to geyser an elongated mouthful of water vertically into the air, in what I took to be delight. "No, Jack—you won't find any cookbooks on *our* ship."

"You've read that story!"

"Story?" He shook his head. *"Twilight Zone."* He paused then and helped himself to another walnut. He chewed noisily as his eyelids slid halfway shut; he seemed to be studying me. He gave a little nod, finally, and said, "We've been telling the truth. Our team is here to study your world and report back, and to prepare humanity for joining the galactic community."

Disappointed with his pat response, I

let my head fall back against the tub's edge. Above me most of the sky had gone deep blue; the horizon still glowed indigo and purple.

But there was something about what he had just said. "Prepare us?" I asked. "You mean by explaining how your society works? By giving us new technology?"

He nodded. "Adding to humanity's knowledge is the first phase of preparation, yes."

A shiver passed up my spine that had nothing to do with hot tub jets. Maybe the Isolationists had it right, after all.

"There's a second phase?"

He tossed a walnut into the air, caught it in his mouth. "Let's talk about angels," he said.

After all the deals I'd negotiated in my career, I knew non-nonchalance when I heard it. We had finally arrived at the actual starting point of tonight's discussion.

I thought back to his earlier comment. "'Destructive,'" I quoted. "Isn't that what you called them?"

He shook his head. "It's the *concept* of angels that's destructive. I mean your current pop-culture version of angels—creatures lesser than God, but greater than man. Beings who are *almost* perfectly moral and good. It's a very old meme, one that's infected most human religions. In some it emerges in the form of supernatural beings; in others you can see it in the original humans themselves, before a fall from grace."

He ducked his snout for a swallow of water, then continued. "As a mere human, obviously you could never measure up to God, whether in knowledge, wisdom, power, or patience. But angels, they're not God. People compare themselves to angels all the time—and always come up short. *I should have been more forgiving!* you berate yourself: *I should have been more like an angel. I knew it was wrong, but I couldn't help myself!* Unlike an angel."

He was reminding me of a religious show I'd surfed past a few nights earlier. "An angel? Or do you mean a saint?"

His snout lifted, as if he were sniffing my words. "Saints! Even better! What's a saint, after all? A rare human who achieves angelic stature. In many of your religions, when a saint dies he even ascends to heaven, to serve God directly—he literally *becomes* an angel."

"So what's wrong with that? The saint provides an example for the rest of us, a model."

"Ah, but how many can ever match that model? And what do you tell yourself when you fail, as you're virtually guaranteed to do every time you're tested? *I should have behaved better—well, I guess I'm no saint!* It doesn't take many times to prove to yourself that saints, like angels, are simply a different breed from you. And then, unless you are truly unusual, you quite logically *give up*. You settle for being *fairly* moral. For trying *reasonably* hard. You feel guilt over past mistakes, but it doesn't occur to you to try and rectify them. After all, it's not like you're some sort of *saint.*"

I frowned. "So you're saying—what? That our moral development is stunted because we can imagine something better to strive toward? That doesn't make any sense at all."

He let himself slide off the bench into the water, where he just floated near the bottom for several seconds. Why had he invited me here, really? Did he want me to air his bizarre argument in my show?

Shaking off the water as he retook his position, he asked, "Have you ever seen the movie *Lord of the Flies?* The story of how, in the absence of external forces, humans will inevitably revert to their innate savagery and evil?"

I nodded, wondering where he was headed now.

He slapped the water with his paw, hard, splashing us both. "That's exactly backwards!" He sounded genuinely angry, his voice squeaking up an octave by the end of his sentence. "It's the precise opposite of your actual phylogeny!"

"Our what?"

He lowered his snout to look directly at me. "Your development as a species. The history of each of your cultures. And the process that you, as individuals, repeat in your personal development." He dropped his mouth to the water's surface and blew bubbles for a few seconds, apparently collecting his thoughts. Then he looked up again. "The message of movies like that is that humans will always be failed angels. But you're *not!* You're actually incredibly *successful*. But not angels—you're incredibly successful *apes!* Apes who all by yourselves—without any guidance from either benevolent gods or sponsoring aliens—figured out language and agriculture and metal-working and love and morality and vaudeville. If *Lord of the Flies* told the *real* story of your species, it would show a shipwreck of illiterate savages struggling together to survive, then going on to invent epic poetry and art deco."

"Also beating their children. And occasionally massacring each other."

"Yes, yes, of course! You're *evolving monkeys!* What do you expect? Not everyone progresses at the same rate. For every forward step there are other steps backwards, or sideways—at the individual level, random influences will always dominate. But, *as a species*, look how far you've come!"

I didn't know what to say. I lifted my water bottle to my lips, but at some point I'd apparently finished its contents, or accidentally spilled them into the tub.

I studied him, this hyper-advanced space alien come to prepare my world for entrance into the greater galactic community. He lolled before me in the deepening darkness, half floating, two of his short arms pressed against the side of the tub. His snout pointed directly at me, nose twitching and head still pushed forward by the vehemence of his argument. Beads of water speckled his slick fur.

I said, "So humanity is, what, the galactic poster child for self-actualization?"

His head tipped back, and he chittered loud and long. "Hardly," he said, his voice as unaffected by his still-chirping laughter as it had been by his earlier walnut-crunching. "How do you suppose *any* sentient species develops?" He shook his head, and then settled back into stillness. Once more he gazed at me over his long snout. "Unfortunately," he said, "the development of your particular species seems to have gotten stuck. Its moral development, I mean."

It took me a few seconds to work that out. Then I said, "You're talking about angels again."

He nodded. "In your present condition, we can't recommend allowing your species out of this solar system."

"What?!" Now *I* was angry. "As long as humanity is *stuck* on angels, we're not morally mature enough to join your society? We're not *good enough* for you?" I pushed myself upright on the slippery bench, so that I was looking downward toward his sprawled form. "That's what you're saying?"

He held up a paw. "To the contrary," he said, slowly shaking his head. "It's *we* who aren't ready for *you*."

I stared.

"Look at your Utopians," he said. "They've already cast my people as the messengers of the gods, bringing light and hope to the world. Can you imagine what will happen to them once your species starts interacting with the rest of the galaxy? They'll be the worst kind of suckers, patsies to the first fast-talking amoeba that gets its pseudopods on them. Before you know it they'll group themselves into feuding cults, each crazily loyal to its own alien race of perfect beings. Next step: interstellar Crusades—with all the rest of us caught in the crossfire.

"Or," he continued, "how about the Isolationists? To them we're *false* angels.

They reject our offered technology, our culture. *No thanks,* they tell us. *We'll stick to the human way*. So where does that lead? Either to a dead-end existence stuck on your birth planet, or else to an independent human space empire. The first would be unfortunate for humanity—not really a problem, though, for the rest of us. But a growing, antagonistic human dominion? Eventually you'll collide with the rest of the galaxy. At first the conflicts will be economic, which is disruptive enough. But sooner or later, guaranteed, we're talking out-and-out war."

The sky had grown quite dark by now. It pressed down on me, as if someone was trying to smother the Earth with an immense pillow.

"You're not just guessing, are you?" I asked. "We're not the first race you've encountered that believed in something like angels."

He sighed. "If your people don't get past this meme soon, there's going to be a fleet of big, ugly warships embargoing your planet."

I stared at him. "Embargoing . . . ?"

"Oh, you'll still be able to launch Earth-orbiting satellites. But manned flight beyond your atmosphere—that will be discouraged. Quite, ah, *rigorously* discouraged."

I pictured spacecraft exploding and falling ablaze back to Earth; the images left me chilled despite the heat of the water in which I sat. This would be humanity's fate? To remain forever imprisoned on our one small world, while throughout the rest of the galaxy other civilizations flourished and grew?

His face held no expression that I could read. *If your people don't get past this meme soon*, he'd said.

I asked, "What's *soon?"*

He shrugged. "Not up to me. Twenty-five years, maybe? Fifty, tops."

I couldn't speak. *Fifty years* to change our race's basic understanding of human nature. Or else.

Once again he seemed to appreciate the thought behind my expression. "Actually, that's plenty of time. Once every human truly understands how much humanity has already accomplished all on its own, how all of your ethics are the product of massive, ongoing self-improvement rather than a fall from unattainable grace, the rest will come quickly. Utopianism and Isolationism will both lose their meaning; humanity will recognize itself as simply the new kid among a galaxy of peers."

For a second he had me. But then I shook my head. "Great. So you put out a press release. You get people like me to spread the word. Then poof—the entire world changes its fundamental beliefs. Uh-huh."

He splashed some water onto his upper chest and started combing through the fur with his paw. "Some of your psychotherapists have a term, *radical acceptance*. Patients have to accept themselves as they truly are, not as they wish they were. Really, deeply, completely accept their actual nature. Once they've done that, it's remarkable how quickly they can finally alter longstanding dysfunctional behaviors."

"So that's your Phase Two? We bombard the world with anti-angel, pro-monkey propaganda until everyone achieves this 'radical acceptance'?"

He paused in his grooming. "Propaganda?" He cocked his head, as if he were surprised by my question. "No, Jack. Our techniques of memetic engineering have progressed a little further than that. I'm not talking about some media campaign."

"Then *what?* And then why the hell have you been telling *me* all of this, if you're not asking me to help broadcast your message?"

"Ah." His snout bobbed up and down. "My apologies for any confusion." He dipped his head to take a mouthful of water, which he proceeded to gargle for a few seconds before swallowing. "I invited you here tonight because your new pilot indicated to me that you are someone who has already, if incompletely, come to accept humanity's true nature. Which qualifies you as a subject for the initial field testing of our memetic treatment. Safety and dosage trials, you understand."

By now the only thing that could astound me was my earlier belief that I somehow had the slightest control over tonight's conversation.

"A *subject*," I repeated.

He nodded. "Once we've established the proper dose and ensure there are no side effects, we'll be ready to fully deploy the treatment. We figure two years for complete coverage. Not specifically for the deployment itself, you understand. But my people have ethical constraints—we must take as much time as needed to ensure that all subjects are fully informed. As I've done with you this evening."

I thought about it. "And the alternative to your treatment is a planetary embargo?"

He nodded again.

Maybe he was just toying with me, making up this entire story of warships and self-esteem treatments merely to be entertained by my reactions. Maybe in another minute an otter camera crew would jump out from under the hot tub and welcome me to Pan-Galactic Candid Camera.

But my gut said that he was telling the truth. And you don't last as many years in this business as I have without a perceptive gut.

Even if it *were* all true, though, why should *I* be the otters' guinea pig? What did the ultimate future of humanity matter to *me?* But that question answered itself; I hadn't produced a historical, or even a Western, for years—deep down, it had never been humanity's *past* that fired my imagination.

I took a deep breath, let it out. "Okay," I told the otter. "I'll do it. Do you want me to sign something?"

His head tilted to one side. "Excuse me?"

"You know, like in the hospital. Informed consent before a procedure, right?"

He stared at me for a few seconds. "Consent?" He shook his head, bemused. *"Before* a procedure?"

My eyes went wide. Wildly I scanned my surroundings. "You mean you've *already—!*" It was too dark to see more than a foot beyond the tub in any direction. "This *treatment*, how . . . ?"

Calmly, he pointed to the bubbling surface of the tub's water. "Actually," he said, "you're soaking in it."

Horrified, I lifted a handful of the water into the air, let it pour from my palm. And then—like the terrified ape I was—I leapt out of the tub, landing half-crouched on the cool grass. I scrabbled for my towel, began frantically rubbing at my torso.

I was shivering something fierce, and not just because of the cold breeze that blew in from the ocean.

"Oh, come now, Jack," said the otter. "Calm yourself. You've been in here over an hour—you've already absorbed a maximal dose."

My rubbing slowed, ceased. Still holding the towel, my hand dropped to my side. The breeze blew over me; I felt goose bumps lift along my arms and chest.

"The treatment," he said, "will need another half hour or so to complete its finer adjustments. But you won't mind, I hope, if I ask you a few questions now. Just a quick safety and efficacy screen, yes?"

I wrapped myself in the towel. I was ready to turn my back on him, march back to the house for my clothes, and drive away.

But then I recalled those exploding, falling spacecraft.

Besides, I *had* given him my permission. Even if it hadn't occurred to him to wait for it.

The otter must have taken my silence for assent. "Good," he said. "So, how do you feel? Any queasiness? Respiratory difficulty? Alterations in fundamental belief systems?"

My adrenaline surged all over again. Taking a quick inventory, I inhaled deeply, exhaled. Wiggled my fingers and toes. Tried my best, despite my resurgent panic, to observe my emotional responses as I pictured the faces of recent Presidential candidates. As best I could determine, everything still seemed to behave just as I remembered. Admittedly, at the moment, Isolationism did strike me as a bit less obviously idiotic than usual—but under the present circumstances I figured that didn't count. So I told him, "No problems."

"Good." In the darkness, walnuts rattled. "Now, please try to imagine a species superior to yours. Not smarter, or stronger, or more experienced. But *morally* superior. Can you do that?"

"Sure."

"*What?*" A quick scratching sound—very much like that of nutcracker teeth slipping across a rough husk—was followed by a soft, walnut-sized splash. "*Innately* your moral superiors?" he squeaked.

"Oh." I wondered whether otter night vision could detect my shrug. "No, not innately. Actually, I was trying to imagine humanity a hundred years from now."

His breath whistled as he released it. "Ah. Well, yes, fine. But how about a nonhuman species? My people, for example?"

I snorted. "Hardly."

"Good. Very good."

I waited. The hot tub bubbled; pine branches rustled.

Had I offended him with my last answer? I said, "Please, go on with your questions."

"Oh, I'm done. Do be sure to phone, though, if any problems arise over the next few days."

I didn't like the sound of this. "Problems?"

"Physical symptoms, emotional issues, whatever. But don't worry—there won't be any. I just have to say that."

I couldn't believe his smugness. "So that's it? No brain scans? No electrodes measuring my subconscious responses to suggestive images? No DNA sequence analysis? You're not going to *check your work?*"

"Really, Jack, you watch too much television." I imagined him waving a forepaw to dismiss my concerns. "We *have* been doing this sort of thing for a *rather* long time, you know." Water splashed in the dark; a few drops sprayed against my cheek. "You're welcome," said the otter, "to tub a while longer if you like. It really can be very relaxing."

"Thanks," I said. "But I think I've been soaked enough for one night."

There was further splashing, and then his voice came from the near side of the tub. "Actually, I was hoping you could stay just a bit longer. You're now someone who can answer a question for me."

"Right. As if I—" Then I caught up with what he'd just said. "What do you mean, *now?* As in, now that you've reprogrammed my *mind?*"

"Merely the slightest rebalancing of your preexisting belief system. Really." He spoke with a dentist's tone of calm reassurance. "Please. It's an important question. And you do look rather chilly." As I hesitated, he added, "Relax—the water won't do anything else to you."

Warships, I reminded myself. *Humanity embargoed.* I sighed, then dropped my towel, and climbed back into the tub.

The water sloshed noisily from my entry; I couldn't hear or see where he was. "Does this thing have a light?" I asked.

A button clicked, and the tub filled with an eerie, pale green illumination. The otter was floating on his back toward the bench across from me, his head hidden within his torso's shadow.

While he made himself comfortable, I asked, "So how many people have you tested your treatment on, so far?"

"Actually," he said, "you're the first."

I wished he had mentioned that detail a bit earlier. "Ah," I replied, hoping that his smug confidence in the treatment's lack of side effects was well justified. "And how many do you plan on using, altogether, for these safety tests?"

"Including you?"

"Yeah."

"Hmm." He paused, as if calculating. "One," he said.

He chittered briefly as I stared, open-mouthed. He spread his three arms—apologetically?—and said, "Standard procedure for these situations. Locate an appropriate native, let him experience the treatment, then have him decide."

"Decide?"

He reached for a walnut. "I did *say* that I had a question for you."

"What—" But I cut myself off, suddenly realizing how he was once again jerking me around. The whole evening had been like this—before I had a chance to process whatever we'd just discussed, he'd distract me with yet another new idea. It was actually a negotiating tactic that I recognized; I just wasn't used to seeing it from the receiving end.

I held up my hand. "Don't say another word. I want a few minutes to think, all right?"

For a couple of seconds he just stared over his snout at me. Then he gave a little nod and turned his attention to the nut resting on his chest.

I took a deep breath, released it slowly. Okay, then—for the first time, tonight's conversation would follow *my* timetable.

I let my head fall back against the tub, and stared upward at the few dozen stars that had managed to overcome the ubiquitous city glow. Wisps of steam rose beside me like pale green wraiths.

I tried to sift my brain for evidence of the otter's tampering. I had never believed in literal angels—at least, I didn't *think* I ever had. But did I really view people as *failed* angels? Well, every morning I certainly shook my head at the human stupidity and viciousness evident in half the headlines in the *Times*. Not to mention ninety percent of the articles in *Variety*.

Now, though, I found myself thinking about the *other* news stories. The ones about people risking their lives to help strangers. About researchers achieving amazing breakthroughs. About novelists, sculptors, or athletes inspiring their audiences to look beyond what they'd always accepted as human limits. Not bad, I thought, for a bunch of monkeys. Maybe the otter's words had brought me to this point, or maybe it really was just some chemicals in a hot tub, but suddenly I felt a rush of unaccustomed *pride* in my species.

But how about aliens? Since my childhood reading of comics and science fiction, I'd always assumed that aliens from outer space would be vastly superior to us in their understanding of the universe—and, yes, in their wisdom and morality. When the otters actually did arrive, their descriptions of a longstanding, peaceful, multicultural civilization spoke to a level of sanity that I had never really believed within humanity's grasp.

Now the otter intended for me to get over this admiration. And as I tried to recall my previous feelings, I realized the degree of his success.

Sure, the aliens had been around longer than us, so of course their *technology* was more advanced. But that didn't make them *wiser* than us, or even smarter. And while they had reportedly solved profound social problems that still plagued humanity—poverty, war, tyranny—it now struck me that as increasing numbers of otter-treated humans started paying attention to those *other* news stories, we'd soon prove no less competent at getting along amongst ourselves.

I glanced over at the otter, who was idly juggling a walnut back and forth between his paws and snout, and I realized that I could guess what he was going to ask me to *decide*.

I said, "You haven't been completely honest with me, have you? About your plans."

He snatched the nut from the air with his mouth, but didn't chew. Silent, he faced me. The tub's light glinted off his eyes.

"Why me?" I asked.

Still saying nothing, he crunched a few times, then swallowed. With a slow nod he acknowledged the assumption behind my questions. "Like I said, you were already close to accepting humanity's place in the universe. But also you're someone who's comfortable thinking about interstellar civilizations—albeit fictional ones. And your career requires that you understand the motivations and desires of many kinds of people."

"A unique combination, am I?"

"Not really." He plucked a bit of walnut shell from his fur. "But you were located conveniently near me, and within our delegation I do have a certain influence." He paused for a second, then broke into a big grin. "Also, I'm a big fan of your sitcom. That episode with the neutron bomb? Priceless!"

I had to smile. But the night was getting late. "Go ahead," I said. "Ask me your question."

He raised a webbed finger. "First," he said, "you should know that we'll be leaving Earth in a month."

"Leaving? All of you?"

Nodding, he said, "We've learned what we need to learn about your world, and we've laid the necessary groundwork for future interactions."

"But—what about those two years of fully informing the populace about your treatment?"

He gave a three-shouldered shrug. "Nothing we can't handle remotely."

"You'll be staying in touch, then?"

"No," he said. "Not after those first couple of years. Next it will be *your* people's turn to come contact *us*."

"Unless we're embargoed, of course."

For a few seconds he didn't say anything. The breeze rustled my hair; the otter's slick fur glistened in the tub's flickering light.

Finally, he said, "Well, so what do you think? Should we deploy our treatment or not?"

There it was, then. The question I'd guessed was coming. The question I'd been dreading.

"It's really up to me? You'll follow my recommendation, however I decide?"

A nod. "That's the procedure. Unless you'd rather we asked someone else?"

I was certainly tempted to pass on this responsibility. But only in the same way I'd be tempted to pass on an exciting but daring new script, knowing that someone else would produce it—and knowing that I'd regret that decision for the rest of my career.

But his words did raise a new concern for me.

"My role in this—will anybody ever find out?"

"Only if you decide to go public. In which case we'll back you up, if you want us to."

I shook my head, relieved. At least there'd be no lynch mobs in my near future.

My decision, I knew, should be easy. Humanity had gotten itself stuck; the otters' elixir would give us the nudge we needed to get past our species-wide inferiority complex and allow us to finally live up to our potential. Life on Earth would improve immeasurably; humanity would be accepted into interstellar civilization. A no-lose proposition, if ever there had been one.

Of course, humanity would never know whether we could have done it all on our own. Maybe I could convince the otters to keep quiet for now about their treatment, but someday the truth would emerge. How would *that* revelation affect humanity's self-esteem?

I turned to the otter. "Other worlds have been through this, right? How has it worked out for them, learning that they needed alien assistance to get past their limitations?"

He shrugged. "Even here on your planet, there are cultures that wouldn't have a problem with that. Not everyone is John Wayne, you know."

I supposed that was true. But with the newfound pride I'd just begun feeling for my species, it rankled me that we wouldn't get the chance to manage this last step by ourselves. Not that the image of humanity being forcibly prevented from leaving our solar system sat terribly well with me, either.

I wasn't getting any closer to a decision. Then it occurred to me that I was approaching my choice as if it were a *plot* problem. What if I instead thought about it as, say, a *marketing* challenge? I had a great property on my hands, after all; what I needed to do now was help the audience learn to properly desire and appreciate what I had to offer. And—I realized with growing excitement—there was a tried-and-true method for accomplishing *that*: I needed to attract a Small But Influential Market.

I pushed away from the tub's wall until I sat upright on the edge of the bench. The breeze was cold across my dripping chest as I asked, "This business of informing everybody about your treatment—how strict are you guys about that?"

His snout lifted as he tried to sniff out where I was headed. "Well," he said slowly, "I suppose we might have some *latitude*—" He waggled a paw from side to side. "—in that regard."

I leaned toward him. "What if I asked you to deploy your treatment—but only on, say, one percent of humanity? Scattered all over the world?"

He cocked his head. "Randomly?"

"Not entirely."

"Ah." He nodded. "The political capitals."

I waved away that idea. "No. Toronto, Sydney, Bombay, Tokyo, Rome, L.A. . . . the *entertainment* capitals. But, yes, the remainder chosen randomly, all over the globe. Could you do that?"

"And not inform anyone about what we'd done?"

I waited.

He let go of the wall. Floating on his back, suddenly he applauded loudly with all six paws.

But his voice dripped with sarcasm. "Oh, bravo, Mr. Karolev! So we're supposed to give you tens of millions of unknowing teachers and prophets—"

"Trendsetters," I suggested.

"—and from that starting point, humanity is going to raise *itself* to maturity?"

"If we're capable of accomplishing that, yes. If your evolving-monkey meme can out-compete our angels."

"And you're not worried," he asked, his skepticism obvious, "about those rugged individualists among you? They won't be upset when they someday learn of our role in humanity's development?"

I shrugged. "Over the long haul, you can't sell people something they don't actually want. If we end up bettering ourselves, who cares whether the initial impetus came from Mahatma Gandhi, Gene Roddenberry, or you guys?"

He floated there, most of his legs slowly treading water. Then he shook his head and, in a tone of deep disappointment, said, "Well, congratulations, Mr. Karolev. You've come up with one I've never heard before." He shook his head again. "Really, that's quite some pitch."

His reaction had leached away my former excitement. But I wasn't ready to drop this. "You *did* say you would follow my recommendations, right?"

He dismissed my question with a wave of a stubby arm. "Somehow," he said, "I don't seem to recall telling you to make up your own rules."

"But my idea—"

He stopped me with a peremptory paw and then broke into a huge grin. "You really can be a sucker sometimes, can't you?" The hooves of his mouth glowed brightly in the tub's green light.

"I *love* your idea! And I'm sure that my colleagues will, too." He paddled over and stuck out a paw. "Jack," he said, "you're brilliant! You've got yourself a deal."

I stared at his offered paw. Then—with more self-control than I'd realized I possessed—I restrained myself from hauling him up by his multiple armpits and shaking that nut-chomping grin off his pointy snout.

We shook hands. And then I let myself fall back against the side of the tub, spent.

He swam awhile, splashing quietly. After a minute or two he settled back onto the opposite bench. The nutcracker crunched, and the familiar chewing began. A few more seconds passed. Then he said, "You know, since you're here anyway . . . well, I had this idea for an episode of your show . . ."

From time to time I nodded, half listening as his high voice rose and fell against the night's steady breeze.

Mostly, though, I was looking up at the stars.

It struck me that we were beaming an awful lot of programming out to all those worlds. Somewhere there had to be sponsors who'd like a piece of that. ■

IN TIMES TO COME

A year or so back, Karl Schroeder dazzled *Analog* readers with *Sun of Suns*, a tale of pirates, cities adrift in three-dimensional space, and a host of other exotica set in Virga, a balloonlike artificial habitat 5000 miles in diameter. Expansive as it was, *Sun of Suns* barely scratched the surface of the scope and variety such a space can hold. In our March issue we begin a new Schroeder serial, *Queen of Candesce*, that takes us into hitherto unexplored regions of Virga—and the things people can become under extreme conditions.

We'll also have a variety of shorter stories including a new episode in C. Sanford Lowe and G. David Nordley's sweeping saga of the Black Hole Project, a new Kristi Lang story by Michael Shara and Jack McDevitt, and decidedly different stories by David Bartell and Amy Bechtel. Stephen L. Gillett, Ph.D., provides the fact article, "Towards a Not-Just-Diamond Age." Much popular writing about the embryonic science of nanotechnology has dealt with the many possibilities for widespread new applications of carbon, but there'll still be plenty of uses for the rest of the periodic table!

THE ALTERNATE VIEW Jeffery D. Kooistra

IMAGINATION

Imagination is an important and useful thing. Where would science fiction be without it? Where would science be without it? Or politics, or Christmas morning, or late night commercials promising buxom women waiting to talk to you on the end of a 900 number? But the imagination can get the better of a person, can lead one to thinking or doing silly things—caving in to false fears, getting over-extended on credit, actually calling that 900 number thinking he's really going to talk to those girls in the commercial.

It's fun to let the imagination run free, but in real life you have to get real, not carried away.

My wife and I enjoy visiting garage sales ("garage sailing" as she calls it). The allure is the same one that drives people to hunt for buried treasure or search for lost gold mines. The imagination conjures up, for me anyway, a rare book priced at a dollar, or a '30s-era floor model radio available for ten bucks (or eight, if I promise to take it away immediately). But then I get real and limit my imagination to the junk radios I'm actually looking for, destined for disassembly and parts harvesting. Sometimes a find proves too valuable to take apart, and this keeps my imagination working (like the '70s-era JVC stereo receiver I'm listening to right now).

So why don't I just visit a Hamfest if I want vintage electronics? Because with a judicious application of imagination, I can see what I need for now, what I can store for a while and then use, and what I don't need now and probably never will. The *rate* at which I accumulate electronics by visiting a few garage sales each week suits the activity level I actually have with my hobby as opposed the level I imagine I'd like to have some day. Turn me loose at a Hamfest and my imagination will outrun my budget in no time.

My wife's imagination works differently than mine. She's real good at finding toys and things that will brighten the eyes of the children when she brings them home. She sees those happy faces in her mind's eye the second her real ones alight on a trash treasure. But what she can't imagine is how rapidly the novelty will wear off and how soon that treasure will end up in the basement along with thousands of other transient delights stuffed into anonymous boxes and long forgotten.

This column originates from my ongoing irritation with what I perceive as the general inability or refusal on the part of people who should have a quality imagination to learn how to *use* that imagination correctly. That is, to not get carried away. What specifically set me off this time were some current events (or rather, *recurrent* events) happening in July of 2006, and points raised in the fact piece in the May, 2005 *Analog*.

Perhaps some of you recall back around last July the concern there was over the long-range missile that the North Koreans were planning to test. Since history happens faster in real life than it does in fiction, I'll recap.

For several days prior to the launch, a great deal of speculation was voiced about what, if anything, the U.S. should do about it. Do nothing? Shoot it down in flight? Destroy it on the pad? Get another country to destroy it on the pad? The North Koreans did launch the missile on the 4th of July (just in time to take away coverage of the first space shuttle launch in a year). It failed very early into the flight and that was that.

During the discussion surrounding the launch—on the TV news, in print journalism, and even in the *Analog* Forum—once again the question arose about whether or not missile defenses should be built and deployed. *Again*, the ridiculous argument was advanced that defenses should not be built because terrorist leaders with nuclear bombs could just sneak them into the country in shipping containers.

This is a good example of an inadequate application of imagination. I've heard this idea put forth by physicists, congressmen, paid political hacks, SF writers, think-tankers, and average Joes. They're all able to imagine Hiroshima USA in the San Francisco Bay, but they never push their imaginations that one inch farther into the mind of the terrorist to understand why it is that so many countries or terrorist organizations insist on building or acquiring missiles anyway. They also forget that the prime reason you build a missile defense is because there are already missiles pointed at you.

Does one not lock the door because a thief could come through the window?

Suppose you're a terrorist and you want to ship a bomb. You have to worry about it being discovered before it's delivered—it's not going to get where you want it to go in 20 minutes. It could be damaged in shipping—it isn't sitting on the pad where it can be maintained right up to zero hour. And those shippers you've entrusted your bomb to—what's to keep them from selling it to another country or group for a hundred million dollars or so?

I'm not advocating we ignore threats via shipments. I have locks on the doors and the windows. But the missile defense question is a lot more complicated than the simple "they could just" argument makes out.

Indeed, the North Korean leadership has thought this matter through—that's why they're building missiles.

The fact article in the May '05 *Analog* is "Big Brother Inc: Surveillance, Security, and the U.S. Citizen," by Laura M. Kelley. I'm only going after this article because it happens to be in *Analog* and so most of you have already read it and likely have access to it. I could have found another suitable piece in almost any newspaper or newsmagazine. Kelley's article isn't exceptionally guilty of egregious sins—it's typical in this regard.

On the surface, the piece is cautionary, dealing with the potential dangers of giving up too much privacy in the hopes of gaining security. It also tries to be something of an "if this goes on" sort of essay. The article contains some useful details about such esoteric and arcane subjects as data mining and risk assessment. But Kelley also employs demagogic applications (or lack thereof) of imagination, and this needs pointing out.

For instance, after describing on page 30 how in the movie *Minority Report* people who might commit violent acts are rounded up on the say-so of psychics, she makes this leap: "(M)en of Middle Eastern ethnicity or Muslim faith are being rounded up to prevent future terrorist attacks. Many of the men detained are indeed guilty of overstaying their visas, *but only in the hopes of making a better life for themselves and their families. They harbor no ill will to the people or institutions of the United States . . .*" (Italics mine).

I'd like to know just how it is that Ms. Kelley knows the "only" reason some of them are overstaying their visas, or whether or not they harbor ill will toward the U.S. Is she a *Minority Report* psychic herself? If she uses some kind of trainable technique, she should teach it to law enforcement personnel. That would save them the trouble of picking up innocent people. But my guess is that she has no technique—it's just what she imagines is the case.

Why does her imagination link the excesses depicted in the movie with what is essentially ordinary law enforcement practice? When you round up people who fit a broad profile, many won't be the ones you actually want to keep, but it's the nature of the beast. This is done all the time. When Mexican gangs are causing trouble in Los Angeles, young Mexican men, most of them guilty of nothing, get rounded up. When the KKK gets active and engages in cross burning, white males are the suspects. Unfortunately for innocent men of Middle Eastern ethnicity, the 9-11 villains were men of similar ethnicity.

Does Ms. Kelley imagine ethnicity can and must be ignored? On page 37 she says, "Being German, the STASI kept meticulous records . . ." She must think ethnicity can be a telling identifier, otherwise she might have said, "Being cogs in a paranoid, totalitarian machine," or words to that effect. Indeed, she imagines the U.S. going the way of Communist East Germany during the height of the cold war.

But she doesn't make the distinction between a totalitarian regime on guard against internal threats from its own subjugated populace, and an open society defending itself against an external terrorist threat. In her imagination, she sees neighbors informing on their neighbors as a terrible, sinister thing. However, with a more realistic application of imagination applied to the contemporary U.S., she could instead picture a nice, wholesome community watch, where neighbors e-mail each other about recent area break-ins. Or perhaps a responsible citizen calling Silent Observer to tell them that his new neighbors are apparently running a crack house, or stockpiling fuel oil and fertilizer.

She also raises this STASI-*spectre*: ". . . this surveillance . . . forced people to change personalities like theatrical masks and create a public self to navigate the outside world and a true or private persona shown only to their closest friends." But that vision also describes every teenager in the world. For that matter, how many of us are the same person at home that we are when we're away? I'm not.

Concerned about abuses that come along with databases full of personal information, she cites the following: "An investigation by the Detroit Free Press in 2001 found that police officers with access to a database for Michigan law enforcement had used it to help their friends or themselves stalk women, threaten motorists, track estranged spouses—even to intimidate political opponents."

That's a pretty bad thing. Imagine what would happen if we put police officers in patrol cars, let them carry guns, and gave them the authority to stop people driving down the road?

I have my own database that would help me do those things if I wanted to—it's called a phone book. And Google is a big help—I had an old friend recently find me that way.

In September of 2001, the World Trade Center was knocked down by real terrorists in real airplanes who could have been stopped with sufficient information management of a suitable database. Objecting to the development and the means to accomplish the development of such a database on the grounds that some cop somewhere, sometime, might use that database improperly to get a date isn't much of an argument.

The future that is upon us will feature wars with countries fighting well-armed and savvy organizations, linked by ideology and shared passions rather than borders. We may even already be, as occasional science fiction author Newt Gingrich puts it, in the opening stages of World War III. Though SF has long pictured that war to be fought with nuclear missiles between hostile, hyper-armed countries, the reality we will actually get is going to be far different. As many of our enemies will be taken down by putting two and two together as will be dispatched with a bullet to the body.

As we fight this war, indeed, we should we be on guard against potential abuses against citizens inherent in an information society. But we can't let our imaginations get carried away by too much worrying about what might happen when we need to sharpen our imaginations to deal with what already *is* happening. ■

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Super Gyro

Grey Rollins

W.S. Gilbert's observation, "When everyone is somebodee, then no one's anybody," may apply in more contexts than he could imagine.

I was the new guy. It had been quite some time since I'd started a new job, and it was even worse than I remembered. You don't know where anything is. You don't know how things are done. You don't understand the secret lingo the other employees use. And to top it all off, they're bustling around you like a hurricane in a bottle, trying to keep things going, and you're standing in the middle of all this organized calamity trying to understand why it's a crisis when someone doesn't get a pickle on their Meat Lover's Delite.

The last time I checked, pickles weren't meat.

But it was my fault that the pickle wasn't there, and that left me embarrassed and a little defensive. Special order. Wanna pickle? Get a pickle. That's the way it's supposed to be. In theory, you could order a Meat Lover's Delite, hold the ham, hold the roast beef, hold the turkey, and all the other things that make it a Meat Lover's, then start piling other things on, like pickles and lettuce and tomatoes and stuff. By which point the curious alchemy of personal preference would have transformed it into a Veggie Delite, but because the customer had told us it was a Meat Lover's back at the other end of the counter, that's what they would be charged for when they got to the register. Things like that make life slippery. The whole menu and ordering process was inane. Whoever came up with such a—

Fingers snapped in front of my face. "Hey, Linus, are you in there?"

I blinked. "Uh, yeah."

"Listen, you've got to get moving. We've got people stacked four deep, waiting for their subs."

"It's just that—"

"I know, but it was just a pickle—not the end of the world. And if we don't get these other folks taken care of, we're going to be in a bit of a pickle ourselves."

Suzanne is the night manager at Spiro's Gyros. She was cutting me slack, and I knew it. But I still felt as though the universe was picking on me, even though it was my fault . . . especially because it was my fault. I pulled out of my trance state and went on with the sandwich I was building. Toss on the translucent slices of ham—so thin you could almost read through them—squirt the mustard, add the lettuce, the Special Seasoning Oil—not to be confused with the Special Seasoning Sauce, mind you—followed by the parsley sprig garnish . . . *whoa*, back up . . .

I looked up. "Sir, would you like a pickle?"

He gave me an understanding smile. "Nah . . . can't stand 'em. But I wouldn't mind a bit more mustard . . . and a little Tabasco, if you've got any."

So I applied the mustard with one eye on him and one eye on the sandwich. One extra zigzagging stripe, artistically crisscrossing the one I'd already done. Then I added a few dashes of Tabasco down the length of the sandwich, cutting across the mustard stripes. It seemed to satisfy him. I walked him to the end of the long, glassed-in counter and turned him over to the cashier. "Number Four. Coffee," I told her. She took over from there, ringing up the total, accepting his money, making change. All the things that make business a two-way street.

I went back to the head of the line and began the ritual all over again. "May I take your order, please?" Walk them down the line. Let them see you build their gyro sandwich right before their eyes. Make little alterations along the way according to whatever they ask for.

Even if it's a pickle.

There's a metal railing behind the restaurant, between the walkway outside the back door and the parking lot. I had burst out the back door of the restaurant, only to fetch up against the rail . . . unable to leave, held by the rail and by responsibilities that I couldn't meet without a paycheck. My thoughts were bleak. I had nowhere to go. No one to talk to. Nothing to do but congratulate myself on landing a job when unemployment was at eighteen percent and rising. It paid less than a third of what I'd been making, but beggars can't be choosers.

So I leaned against the cold yellow metal rail and counted stars, wondering if there was anyone out there. Anyone at all. And if there was, could they come beam me up right away, because I wasn't so sure I wanted to be on Earth anymore.

The door behind me opened. Suzanne leaned out, peering around the edge. She spotted me and stepped out into the chilly air, wrapping her arms around herself as though they were some sort of twine that could hold her body heat in.

"Good. You're still here. I was afraid you'd left."

I shook my head. "Still here." I glanced at my watch. "Seven minutes before my break is up. Just . . ." I sighed heavily. "Just wishing, is all."

The look she gave me made me realize that she was, in fact, human. Up until that moment, she'd been anonymous, as much mystery as person. Her eyes did some trick where they opened up and I thought I could see her . . . the real her, not Suzanne-the-night-manager. I thought she was attractive and possibly even nice, and had even thought about asking her out, but she was also my supervisor, which made things difficult. Intimidating, actually. What if she said no? Then my career—so-called—would rest in the hands of a woman who had rejected me. Not to mention that it's against company policy. I didn't know how to handle it. I glanced at my watch to cover my nervousness. A little over six minutes to go.

"Besides," I added. "I wouldn't just up and quit on you without saying anything. It wouldn't be right."

She regarded me steadily for a moment, then nodded in understanding. "I'll leave you alone, then. Just wanted to make sure you were okay." She turned and started for the door, already reaching for the fingerprint scanner.

"Hey, Suzanne, can I ask you something?" Oh, damn. My mouth had gone and done something without asking permission. Now I was in for it.

She paused, half turning back. "Yeah. Sure. What?"

"Just then . . . you looked at me funny. It was something with your eyes. Is that your power?"

She looked down at the ground for a moment, then took a step towards me. I wanted to vanish. I wanted to send my mouth to obedience school. I wanted a make-it-unhappen button on my life. You're not supposed to ask someone about their power. It's rude. You're supposed to let them tell you—if and when they're ready. The reason it's rude is that—even though it's cheaper now—not everyone can afford to gene-modify their kids. Back in our grandparents' time, it had been a stretch to afford braces for their kids. Now it's little tweaks to their genes. But me, I'd gone and opened my big mouth and broken the unwritten rule.

Aliens? Are you listening? Beam me up *now!*

Then, almost shyly, she held up her right hand, fingers closed, except for her pinky, which stuck straight up. Her eyes on me, gauging my reaction, she lit her fingernail. "Lightning bug genes. Luciferin and luciferase as metabolic byproducts. Lame, isn't it?"

Sure, it was common, but I wasn't about to say that. "No, I think it's cool. Really. It must help when you're trying to find something you dropped in the dark."

She smiled again. Nicely. And led me back inside, just as my break was over.

But she was polite enough not to ask me about my power. Suzanne's manners were better than that.

The whole power thing was the result of a long, complex dance that had ensued after scientists had unlocked the human genome, followed shortly thereafter by the gene sequences for nearly every other living thing on the planet. The next step had been alterations to the DNA for revenue-producing animals like cattle and pigs, not to mention wheat and rice. The entire library of DNA maps resides in dozens of mirror sites around the world. Although anthrax, botulism, and other dangerous things are heavily restricted, it's nothing for a high school student to download the DNA for *Apis mellifera*, the European honeybee, for a science project.

If history teaches us anything, it's that knowledge will eventually be used. The whole "there are some things man was not meant to know" argument can divert this trend temporarily, but it will never stop it. The only question is *how* the information is used . . . and by whom.

Religious fanatics didn't want to change "God's blueprint for man." Other, more moderate people claimed that God wouldn't have encoded this information if it weren't meant to be used once we had the means to retrieve it. Secular citizens were all over the map, not as easily categorized. It didn't matter. The historical trend rolled over all of them as though they weren't even there. Willing or unwilling, it didn't matter.

The first high-profile case was the son of Evan Williams, the football player. He wanted his son to grow up strong and, presumably, to be the founding father of a dynasty of hulking players who would just as soon tackle a hippopotamus as look at it. His son, whimsically named Odd, indeed grew big and strong, but chose to use his abilities in pro wrestling. Sports, and yet not. A bittersweet victory for dear old dad, no doubt.

By the time Odd was ten, he had a half-dozen other youngsters riding his coattails. An actress who wanted to pass on her looks actually succeeded. A race car driver tried to pass on his lightning reflexes without notable success. And so on for the next few years while they worked the bugs out of the process. Behind them came a crowd of others, sons and daughters of anyone who had sufficient discretionary income to enhance their child in any conceivable way.

You would think that everyone would

go for three things: looks, intelligence, and freedom from disease. It didn't work out that way. Not obvious enough. Looks are visible, of course, but how do you know whether it was natural or man-made? Intelligence? Far too subtle. Disease resistance? Forget it. When wealthy parents start dropping that kind of money, they want it to be obvious. And so kids started sprouting unusual but unmistakably designed enhancements like body hair that grew in zebra stripes, or cute little angel wings. The worst of the nonsense calmed down after ten years or so, simply because kids sprouting antlers are dangerous to have tearing around the house. Once things got a little less ostentatious, people started having more useful powers, like the girl I lived next door to as a child, who had fingers that looked like a cross between caterpillars and octopus tentacles.

Granted, it looked bizarre but, man, she could sure play a piano.

Social strata developed quickly. People who were filthy, stinking rich could easily afford to have two or three, sometimes more, enhancements for their children. Middle class folks could generally scrape enough money together to afford one of the easy modifications. Lower income people couldn't afford any. It was no more than the newest wave of conspicuous consumption: children as luxury possessions. The Mercedes in the driveway. The daughter with the five octave singing range. The son with the ability to dominate his school's track team, thanks to cheetah genes.

That's where the manners thing came in. Since there was this undeniable undertow of money, it was tantamount to asking how much money someone's parents made if you asked about their power. If it was obvious, you knew. If you found out by accident, it was gossip fodder for the next month. If you couldn't tell, you didn't ask.

The effect on the kids themselves was predictable, at least in hindsight. Since the modifications had to be made *in utero*, it was hardly possible to ask the fetus its opinion. As a result, a child might pop out of the womb with the ability to breathe under water, whether they wanted it or not. Some didn't. A statistical fraction were unable to adjust and committed suicide. The ones who did adjust—more or less—were subject to the usual childhood cruelties, amplified. Pecking orders arose based on the perceived value of their powers. Brutality perpetrated by those whose parents had thought it desirable to give their offspring something like tiger claws was rampant. Understandably, there was a strong tendency for kids like that to fall out of the mainstream and join gangs. As a result, claws were the subject of an ongoing legal tug-of-war as to whether they should be banned. Believe it or not, some parents actually did opt for brains. Test scores went haywire; grading on a very lenient curve became necessary if any substantial portion of students were to receive diplomas.

Fair?

No.

But that's the way life is. You deal with it as best you can and go on. In a sense, it's the same thing that people went through before the development of powers. They got by. And we got by. It just added another layer of complexity to the already difficult process of growing up.

With the economy crashing due to everyone's attempts to "help" it, there were fewer kids being born with powers, simply as a matter of economics. But that didn't mean that there weren't still people running around with the ability to change color like a chameleon.

The teenager across the counter from me kept sweeping waves of color across his face as he ordered. I decided that it wasn't chameleon genes, it was more likely one of those squid sequences . . . something that allows the creature to flash messages, if only you know how to read the code. "My girlfriend, she wants a Veggie Delite and a cup of water." For no discernable reason, he suddenly flashed red, then purple. I wondered briefly if his girlfriend had learned to read his nonverbal messages. "Gimme a Number Six, with extra mayonnaise and . . . uh . . . let's see, a Pepsi."

Don't ask me why some of the sandwiches have numbers and some have names. Some nameless nitwit at the corporate level passed down the nomenclature like Holy Writ, doubtless because a middle management focus group decided that a name made the product more "special" in the customer's mind, hence worth more money. Our top-of-the-heap sandwich, the Super, was obvious enough. More of everything on it. More cachet. More money. Nevertheless, the whole thing was dumb, if you stopped and thought about it.

Psychology is a dimly lit corner of science. Throw in merchandising and the lights go out altogether. It becomes a dark and dangerous alley where people are always reaching for your wallet.

I built the sub and handed him off to the cashier, trying desperately to smother the little nagging voice inside my head that kept insisting I was better than this.

On break I went out to look at the stars, but the skies were overcast, reflecting the dull orange glow of the sodium lamps at the mall two blocks away. I perched on the metal rail and waited. I didn't know what I was waiting for. There was just this persistent pressure in the air that made me feel antsy. As I pressed my finger against the scanner to get back inside, a fat glob of rain splatted next to it, confusing the reader. I had to try again before the system would admit that I existed and let me inside.

Barry is this tall, skinny guy who handles some of the back line preparation. As I was walking through the back, I swear I saw him using a claw to scrape gunk out of a groove around the edge of the prep table. I did a discreet second glance, but saw nothing out of the ordinary. I said nothing.

Instead, I pulled on the green and white hat with the stupid little foam gyro sandwich poking out the front like a rhino horn and went to take the next person in line. The sandwich on my hat wore a mask and a cape, though the only power it had was to shrivel the souls of those desperate enough to try it on. I tried not to feel self-conscious. It didn't work.

So far, we'd been lucky—even though the economy was falling apart, people were still eating out. Probably due in part to the recent trend toward building apartments without stoves or ovens. Why go to the trouble and expense to put them in when people never cook for themselves anymore? I didn't think that mindset would last much longer, but kept my opinion to myself. It was incompatible with my mantra: Pay the bills . . . Pay the bills . . . Pay the bills.

"I want a—well, it's not for me, it's for my wife—she wants a . . . a . . . oh, hell, I can't remember what she told me. Can you hang on a second and let me go ask her?" Without waiting for a reply, he dashed back toward the dining area.

The woman behind him stepped forward with a girl in tow. She didn't bother waiting for the forgetful man's return, she just launched into her order. "I want a Number Three," she said. "Nandy wants a Number Two."

"Mooom!" her daughter said in that singsong way adolescents use when they feel that their parents are treating them as though they're younger than they perceive themselves to be. "Do you have to say it that way? It sounds like I've got to go to the bathroom or something. Besides, I don't want a Two, I want a Meat Lover's."

The woman frowned at her and said, "You eat too much meat. It isn't good for you." She turned back to me and said firmly, "She'll have the Number Two."

I gave the girl an apologetic shrug as I pulled a bun off the rack behind me and slit it with the long, serrated bread knife before slathering Special Sauce on it. They fought and argued all the way to the end of the line, heedless of the fact that I was caught in the cross fire, then turned sweet for the cashier. There's something deep in human nature that causes that, but I have yet to figure out what it is.

"You didn't wait for me," the forgetful man began.

"I waited, but the other customers didn't." I gave him a smile, trying to make it a joke.

He grunted. "Never mind, let's get this show on the road. My wife says she wants a Seven and I'll take a Super."

Endless, mind-numbing, repetitive work anyone could do. Since I lacked a convincing reason for anyone to turn a paycheck over to me unearned, I had to endure smelling like Special Sauce every night when I went home. I was fast becoming convinced that the suicide rate in the fast food industry must be ten times the norm.

The next guy was different. Some kind of attitude aura. Rain was dripping from his hair. His eyes were unnaturally bright.

"May I help you, sir?" I asked.

"I want a Number Two . . . no . . ." he said, his eyes scanning the board above my head listing all the sandwiches we sell, "make that a Six. And a Bud."

"Sorry, sir, we don't sell beer. But you can have the sandwich as takeout and pick up a beer at the store up the street."

It is definitely *not* company policy to tell the customer to go somewhere else for their drink. We're supposed to suggest things that *we* sell, so that we can make the profit instead of someone else. The problem was that the guy was making the hairs on the back of my neck stand up. There was something wrong with him, and I wanted him out of the store as fast as possible.

Something feral flared in his eyes, but he locked the inner beast away and said, "Nah, I'll just take an orange drink. Ain't had one of them in a while."

The fellow behind him leaned around his shoulder and said, "I want the Number Five. And gimme a large tea. We been doing thirsty work."

I hadn't realized that they were together, but it wasn't any problem to pull another bun, slit it, and start slapping ingredients on it.

We made it halfway down the counter before the trouble started.

"Hey, man, is that blood on your jacket?" the customer behind them asked.

Suzanne was to my left, building that customer's sub. She looked up, concerned. "Wow! Sure looks like it. Are you okay, sir?"

They were looking at the second of my two customers—the one who had ordered the Five. He frowned, twisting his neck, trying to stare down at his own back. It didn't work.

"Turn around, Tom," the first one said calmly. "Let me see."

Tom turned his back. Sure enough, even with the rain, there was something that looked a lot like blood on the back of his right shoulder.

"You *idiot!* I told you to clean that off," the first one growled.

After that things started happening very quickly. The first of my customers reached under his brown leather jacket and pulled out a gun. He pointed it at the first person he saw.

Me.

"All right, fella. Just stay calm."

To show him how calm I was, I asked, "Would you like pickles on your sandwich, sir?"

He rapped the butt of his pistol sharply on the curved glass sneeze shield above the counter. "No, I don't want any frippin' pickles! Gimme the sandwich. Now."

Tom had turned back and was reaching into his jacket, too. Given the way things were going, I wasn't at all surprised to see his hand coming back out holding an even bigger gun than the first guy had.

Honestly, I think I preferred the boredom.

Tom, the second man, was scaring me, and it wasn't just that his gun was bigger. It was his eyes. They were jittering in his head. His hand was shaking. His whole body seemed to be experiencing a personal earthquake. I was afraid that his gun would go off just from the way he was twitching. I hadn't really looked at him before. At first, he'd been behind the first guy, then I'd had my head down, making the sandwiches. Now I was looking at him and wishing I wasn't.

Some small, panicky part of my brain wasn't locked in on what was happening. It was trying frantically to raise someone on the alien mother ship. Someone who knew which buttons to push on the console to get me out of here. A few sparkles in the air and I'd be gone, leaving behind a really, really uncomfortable situation. It wasn't working.

Suzanne began, "Sir, I'm sure there's no need for guns. Just tell us what you want and we'll gladly—"

The first guy whirled and held the gun at the end of a ruler-straight arm. *"Shut—up."* Two words. Clear and distinct.

She blinked and her mouth shut.

"Frank, I think there's someone in the back," Tom said.

The first guy, Frank, leaned across the glass towards Suzanne. I could see her eye reflected in the chrome plating of his gun, because the muzzle was pressed against the bridge of her nose. "Tell all the people in the back to come out now. *Now!"*

"There's just the one guy," she said nervously. "Uh, Barry, there's someone out here who wants to meet you."

"Meet me? What are you talking about?" He came around the corner wiping his hands on his apron. He saw the guns. He froze on the spot. *"Whoa!"*

"Don't move," Frank ordered. He whirled and shouted, "Everybody pull out your phones and throw them on the floor! Do it now!"

The woman who had argued with her daughter was already dialing frantically. Tom raised his arm, sighted, and pulled the trigger.

Suzanne screamed at the same instant that the gun went off. Everyone else screamed just after. The woman's daughter shrieked so loudly that I thought the plate glass windows would shatter.

"Everybody shut up," Frank said. Everyone did, except the daughter, who was sobbing uncontrollably. "I said throw your phones on the floor, and I meant it."

There was a plastic clatter as phones hit the tile floor. Two or three of them shattered, their owners threw them so hard.

Tom smiled a crooked smile. "Now pull out your wallets and put them on the table tops. Money, credit cards, and all."

Some obeyed instantly. Some were slower to react. They moved a little faster when Tom's gun started jerking and twitching in their direction.

"Come on, people!" he shouted. "You came here to eat. I know you didn't expect to eat for free. You've got money . . . now out with it!"

Without anyone noticing, Frank had slid down to the end of the counter. He was behind it now, with the barrel of his gun pressed into the soft skin of the cashier's neck. "All right, you know what I want. Open the register . . . that's right."

Somehow, I knew what Suzanne was thinking. She was thinking about the small round safe set flush into the concrete floor in the tiny office in the back, under a small rug. It probably held a couple thousand dollars.

But neither Frank nor Tom asked about a safe. This was a spur of the moment thing, precipitated by someone noticing blood on Tom's jacket, and they were making the whole thing up as they went along.

Frank pulled a large paper takeout bag from the dispenser and stuffed the money from the register into it. "Come on, Tom, let's go. This ain't going to last long."

"In a minute. I want—"

But then he heard the siren. The woman must have dialed faster than I thought.

"Now, Tom," Frank said urgently, but it was already too late.

I saw the flashing lights pull into the parking lot. Tom saw them, too. He took aim and fired right through the window at the police cruiser. The plate glass shattered. The cruiser stopped instantly, as though it had hit a wall. All the customers who had been on their feet, feeling for wallets or looking in purses, dove for the floor, expecting a shootout.

There were five of us still on our feet. The two bad guys, Barry, Suzanne, and me. Wendy, our cashier, was trying to make herself as small as possible in the cubby under the cash register. Every single one of the customers was prone on the floor. Strike that—there was one guy sliding along the wall to my left, hoping that Tom and Frank's attention stayed focused on the cruiser a little longer. I watched him out of the corner of my eye. He inched closer, stopped, took another step, stopped. His back was pressed against the wall so hard I could almost hear him squeak as he moved. All it would take was Tom turning a little to his left and the game would be over.

Tom and Frank were staring at the flashing lights on the cop car as though they'd never seen such a thing before. I looked at Suzanne. She looked at me, frowning worriedly, and shrugged. I knew what she meant. Glowing fingernails weren't going to be of much use, here. She glanced past me down at Wendy, giving her a meaningful glance. Wendy shook her head fearfully and backed further into the cubby. No power, or at least nothing that would help.

The customer made his move. He slipped in behind Tom and reached for his throat with both hands. I thought he was going for a stranglehold. Then his mouth opened, and I saw his teeth. Lots of teeth. Sharks dream of teeth like that.

The dead woman's daughter screamed, anticipating carnage. It was the worst thing she could have done.

Tom turned, but Frank whirled around faster. His gun barked twice, and the shark-toothed guy went down.

The girl changed frequency and screamed again.

"Tom, we need to leave right now. This isn't going to get any better."

"It's not, eh? How about this?" He walked over and grabbed the poor child by her hair, jerking her to her feet. The screaming stopped as though cut off by a knife, replaced by whimpering. "How's about a little insurance? What do you say, Frank?"

The kid was so terrified that white was showing all around her staring eyes. "No," she whispered, "not me. Please."

Tom pulled her in close. His voice was suddenly unnervingly calm and quiet. "It's all right, dear. Everything's going to be all right. Just relax and we'll let you out a few miles down the road." Somehow that was worse than the twitching. My skin crawled just listening to him.

Suzanne and I turned as one to look at Barry. He nodded and started moving silently toward the cashier's station, the only way out from behind the counter into the front of the store.

Frank didn't seem convinced that a hostage was the answer to the police cruiser squatting silently in the parking lot. "Tom, drop it. We're going to have to move fast, and she's just going to slow us down."

Tom's grin was slow and filled with menace. "Well, then we'll just pop her and drop her, if you get my meaning. When the time is right, that is."

Out of the corner of my eye, I saw Barry round the end of the counter, accelerating.

At the same moment, Tom saw him and fired.

Missed.

Barry howled as he leaped across the remaining distance between himself and Frank, ten claws slashing.

Frank heard Barry's scream of rage and

turned just in time to get a hand up. I swear Frank barely touched him, but Barry went spastic in midair. Then they collided and went down. Frank kicked himself free and stood, leaving Barry twitching spasmodically on the floor. All I could think of was something like jellyfish venom, but whatever it was, it didn't look good.

Tom threw the girl bodily back into the booth, walked over, and fired three times. He couldn't miss at that range. It wasn't as though Barry was still an active threat—it was just retribution for having dared to try something.

Frank's gun was minus two bullets. Tom's was minus six. The question was how many each gun had held to begin with. Six? Nine? Fifteen? Had any been fired in whatever had led to blood being on Tom's jacket? Obviously Frank had something potent, but did Tom have a significant power? Too many unknowns.

I took a deep breath and turned my attention back to the cop. The plate glass in the window had robbed Tom's bullet of velocity. The police cruiser's starred window had absorbed more. Each would have thrown off the slug's trajectory. No matter how carefully he aimed, the freak thing would be for the bullet to have actually hit the cop at all, much less kill him. I couldn't see the cop, so that meant he was keeping low, below the dash, probably calling for reinforcements. It was only a matter of time until help arrived.

But even if a small army of police showed up, they would have no way of knowing how many gunmen were in the restaurant. They would have no way of telling how well armed they were or what their intentions were. Even once the SWAT guys and negotiators showed up, it was going to take a long time for them to assess the situation and I wasn't sure that Tom's mental state was going to maintain its fragile balance long enough for the cops to hatch a plan.

Frank gave Barry's body a disinterested glance. "Tom, I think it's time to go to plan B," he said.

Tom's eyes flinched in his partner's direction. "Plan B? What Plan B?"

"Hostages," Frank said. There was no evidence of emotion in his voice. It was just a pragmatic response to a problem. "Everybody. Not just the girl. We'll shoot one every thirty minutes until they give us what we want—a clear way out of here, our car, and no pursuit. We'll start by shooting one immediately so they know that we're not playing games." He scanned the room. Inevitably, his gaze came to rest on Suzanne and me, since we were the only ones still standing. Though he didn't say anything, his eyes locked on Suzanne.

Suzanne's face turned pale. It struck me as unlikely that murder and armed robbery had been covered in her how-to-be-a-manager course two years previously.

The customers? There were eight left alive, and none of them looked as though they were cut in the hero mold—with three lying dead on the floor, why die for the money in a faceless corporation's cash register? Let the cops handle it. They were paid to do that sort of thing. Either the killing hostages thing hadn't sunk in yet or they thought the cops would take care of the bad guys before their turn came.

I don't have lightning reactions, and I don't claim to have much of a killer instinct, but at that moment I faced the fact that it was time to take action. My one and only asset was that I was pretty fair at reading human nature.

I chanced a quick look around, taking inventory of what was within arm's reach. Not much. A rack half full of unsliced buns, a pair of tongs, and some condiments. Somehow, I couldn't see myself barging out from behind the counter, brandishing a spritzer of olive oil at them. Still, there were one or two items of interest.

"Listen, Frank, there's a back door," I said. "Right now, there's only the one cop, and he's out front—"

"Dead," Tom said confidently.

I didn't agree, but it certainly wasn't the time to argue the point. "Okay, but still, if you go out the back you can run across the parking lot, through the trees, and there's a motel there. Across the street from the motel is a car lot. Take one and no one knows what make, model, or color it is. You can get away clean, but you're going to have to move fast, before any more cops get here."

There had been enough signals that Frank was the thinking man of the pair; the dominant one. I had to seem reasonable, helpful, nonthreatening.

"So what's it to you?" he demanded suspiciously.

I held up my hands, palms out. Stage One. "Just trying to help, man. We all want to get out of this in one piece. This way everybody wins."

"Our car!" Tom yelled, taking the bait. "We want *our* car! We don't want no damned car we've got to hotwire."

"Where's your car parked?" I asked, moving toward Tom, maintaining eye contact, trying hard to look sincere. He seemed as puzzled as his partner as to why I was being so helpful as to plan their getaway for them. I passed Wendy, rounded the end of the counter, and began scanning the parking lot with my back to both of them, hands still in the air. "Which car's yours? Is the cop car blocking you in?"

I was out from behind the counter, in position, and they hadn't shot me. Stage Two, complete.

Frank came up on my right, pointing. "That one. The metallic blue Ford sedan."

"Damn. Blocked. Do you think you can go forward . . . over the curb?" I pointed with my right forefinger, arm extended nearly full out.

Frank spoke from behind my right shoulder, close. "What if we get stuck? The front tires go over, but the bottom of the car hangs—"

It was now or never.

I slashed my right arm down suddenly, dropping the bottle of Tabasco I'd slid up my sleeve into my hand. With everything I had, I swung the bottle against the metal sill at the bottom of the window, breaking the long, narrow neck. Sweeping up, I jerked the raw, open top of the bottle over the top of my left shoulder, directly into Tom's face, broken glass, hot sauce, and all.

He shrieked as though all the demons of hell were tormenting him and dropped to the floor, clawing at his face. His gun fell from his hand, unheeded.

There wasn't time to grab the gun. I dropped the serrated bread knife I had up my left sleeve into place and whirled to my right. Frank was just beginning to register the Tabasco. His gut reaction was that I was about to try the same thing on him. He seized my right forearm with his free hand. Even through the fabric of my sleeve, a jolt of incredible pain rushed up my arm, through my shoulder, and into my chest. My knees nearly buckled, but I kept forcing my body to turn, pushing the knife toward where I knew his stomach would be.

He fired the gun just as we came fully face to face. At first I thought he'd shot himself. A few seconds of shocked delay and the truth came home, along with the pain. He'd shot me. We both collapsed clumsily to the floor, clinging to each other for balance and support like old friends.

But as we went down, I saw one of the customers coming up behind him, mayhem in his eye. I'd done enough. I let go and toppled backward.

Stage Three. Complete.

The three of us lived. All three of us acquired scars to show for the experience. Tom lost the use of his left eye. I can't say that I spend much time feeling guilty about it.

It turned out that the power Frank had was electric eel genes, not jellyfish. Given that they were on the prohibited list, he'd probably gotten his power on the black market. That, in turn, implicated his parents. It was all turning into a merry mess as the ripples spread and more people were dragged in.

I became a three-day wonder. They called me a hero—in my opinion, a much overused word. Local news personalities waited in line to interview me. Then the story went national, and another wave of reporters came in. They asked the same questions and made the same sympathetic noises at the same times when they asked if it hurt to be shot and I replied yes. It was like a succession of visits from clones clad in different skins. Their very predictability was disheartening.

In some manner, I became the darling of the conservatives. They lauded my "courage" and said that I was a "patriot." They postured for the cameras and spouted all the usual clichés about the right to bear arms and how the police were outnumbered by lawless scum, etc, etc, etc. Nauseating, really. Paradoxically, the liberals also loved me because I had been a grunt in the lowest echelon of a megacorporation and had stood up for what was right—not corporate profits, but the safety of innocent people. That was closer, though still not on the mark. But no one asked about my motives and I, seeing the way the wind was blowing, didn't volunteer.

I felt unaccountably lonely after the reporters left. Given the restless irritation I'd felt during the interviews, this took me by surprise. Eventually, I faced the fact that it was the letdown I felt going from celebrity back to anonymity. That was so insulting that I had to give myself a good talking-to. I hadn't realized that I'd had that sort of vanity lurking inside of me and felt ashamed now that it had reared its ugly head. A little more reflection and I realized that I was also disappointed that I hadn't heard from the one person I really wanted to hear from.

That was rectified on the day I was to be released. There was a polite knock on the door to my room, followed by Suzanne tipping her head in. "Hi!" she said brightly.

I looked at the clock. It was just past eleven in the morning. "You're impossibly cheerful for someone who works the evening shift," I grumped. "If you keep this up, I'll have a relapse."

She smiled—only the second time I'd seen her do so, but it was something I'd thought a lot about over the last few days. "Nah, you just need someone to complain to for a while. I've nominated myself as the complainee."

"You don't need to do that. I'm perfectly capable of feeling sorry for myself, by myself."

Suzanne came and perched on the side of the bed. "Considering that I've already got your belongings in the trunk of my car and have signed for you, you don't really have much choice."

I frowned. "How did you—"

"Let's be practical. There's no one to pick you up and take you home, right? So what were you going to do . . . call a cab?"

"Well, I—"

"And cabs are dirty, and you might pick up an infection or something, so that's not really such a good idea, right?"

"But—"

"And you're going to need someone to change the dressings on your exit wound. Being on your back and all, it's going to be hard to get to, and it'll probably hurt a lot, and you might not do it right. So that's not all that great a plan, either, right?"

"Then—"

"And besides, it's not like it's all that much trouble. I don't think I got around to mentioning that I live in the same apartment complex as you, two buildings over, so I can get there in an instant if you need me and leave easily if you get tired." She rocked back with her arms folded and a self-satisfied expression on her face. "Well? Can you argue your way out of that?"

I sat and sulked. Okay . . . I *tried* to sulk, but it just wouldn't come together. Then I tried to get mad, but that didn't work either, so I sighed and said, "You win."

"Good. I'm glad to see that you can be reasoned with."

"Reason has nothing to do with it. I'm desperately lonely and having you coming in here being all cute and irrepressible is unfair and very *un*reasonable, and why are you doing this, anyway?"

She dimpled. "I could make something up, I guess, but the fact of the matter is that I think you're interesting, and I intend to get to know you much better. Besides, not like it's important to me or anything, but you saved my life, so I guess you could say that factors in there, too."

"Do you always talk this much?"

"Only when I'm nervous."

Which made me laugh, which in turn hurt like hell, which caused Suzanne to get all flustered, and things got a little confused for a moment. When it was over, I found that she was holding me—just for support, I suppose. Being temporarily overcome with an excess of nobility, I decided not to complain.

Once I was breathing normally again, she leaned back and looked me in the eye. "Look, Linus, can I ask you something?" she asked.

"Sure."

"At the restaurant, when you . . . did what you did to Frank and Tom, did you use some sort of power? I mean, it was all over so quickly and everything. It looked like you were moving faster than anyone possibly could."

Turn about, fair play. I sighed. "Suzanne, I don't have any powers at all. Not a one. But growing up in a world where nearly everyone had some sort of edge on me, I had to come up with something to stay even. I learned to predict what people were thinking and what they were going to do. Everything I did was based on human nature. If you point at something, people will just naturally look at what you're pointing at, not at you. Frank and Tom wanted nothing more than to get out of there, so any possibility of escape would draw and hold their attention. Frank was the brains, but Tom was the most dangerous, so I had to take him out first. Once I struck at Tom, it was trivial to guess that Frank would turn into the knife I was holding. When you lay it out step by step, it's like Sherlock Holmes explaining his deductive process—it makes it sound easy. It's planning ahead and keeping all the steps in order in your mind that's tricky. It's just something I learned to do back when I was a kid. A survival skill."

She leaned back, looking into my eyes. "Well, since I'm playing Watson, there's still one thing I don't understand."

"What's that?"

"Why you did it at all. You could have waited for the police."

I shifted uncomfortably. "Uh . . . not when they were threatening to shoot hostages. After killing three people, it didn't seem like they'd stop until they ran out of bullets. Since the cops weren't going to get there in time to stop them from killing another hostage, I thought I'd better do something."

"Actually, they had murdered four people. The blood on Tom's jacket was from someone they'd robbed and killed about thirty minutes before coming to the restaurant."

I shook my head. "I wish none of it had happened, but we're where we are and . . . I guess it's time to fess up."

Suzanne's brows furrowed. "I don't understand . . . what do you need to 'fess up' about?"

"I couldn't just stand by and let them use you for target practice. I . . . well . . . I was still working up the courage to ask you out. I needed more time."

Her eyes opened wide. "Oh, how sweet!" She clasped her hands and batted her eyelashes in an exaggerated manner. "My savior!" she exclaimed in a high-pitched voice. "My *hero!*"

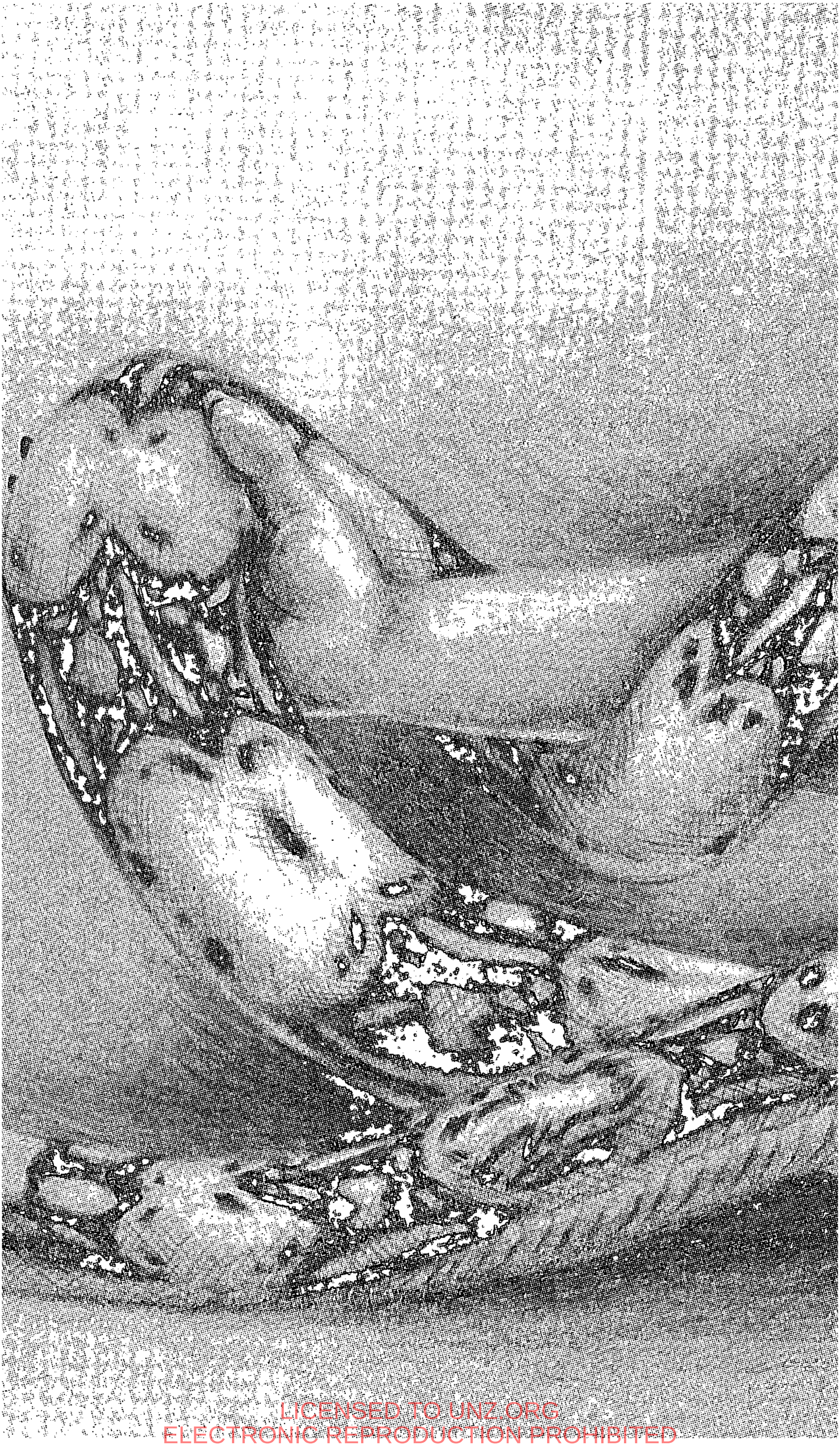
I grimaced. "Just be sure you spell it with an 'h' instead of a 'g.' I've had about all the sandwiches I can stand for a while." ■

Exposure Therapy

R. Emrys Gordon

Opportunities seldom come without strings. . . .

Illustration by Bill Warren



I looked around for witnesses: an old habit and an unhealthy one. Zulu was in front of me, Tess to my side. Except for them, I was alone. Tess smiled encouragement and mouthed something I didn't catch. Looking around had been a mistake; I'd caught a glimpse of Zulu. He was slithering over his own coils, blank black eyes staring out of the front of his glass tank. My heart forced itself into my awareness, beating too fast. I held my hands very still and tried to breathe slowly.

I had two overwhelming fears that I had never been able to conquer. The second was the fear of anybody realizing that I was afraid.

"Do you want to try moving? Or looking at him for a whole second?" Tess had all the smug concern of the fellow who never gets seasick for the guy on the railing.

"Just a moment." I attempted to lift my arm, experimentally. My hands started to shake. When I tried to clamp down, they wouldn't stop. Then the nausea began, and that made me shake more. I couldn't get sick here; Zulu was contraband—I couldn't get sick anywhere, because the mission heads would want to know why. And if they couldn't figure it out, I'd be quarantined, banned from going dirtside—and I wanted to go down to the planet more than I'd wanted anything else in my entire life. I was just terrified to do so.

"I'll try this later." I backed out the door and sagged against the wall of the corridor. I rubbed my temples and felt the trembling begin to subside. The air in the hallway seemed cooler than in Tess's quarters. In a moment she appeared beside me.

"That worked well." The sarcasm that Tess carried with her like a shield was grating on me after a month, but I could deal with that. The little tensions that sprang up in close quarters, the outgrowths of claustrophobia and discomfort that people came up with on a spaceship—those were my specialty (or part of it, anyway). I could deal with those.

"This sort of thing never works on the first try," I told her.

"We've got three weeks."

"That's plenty of time. You can extinguish a simple phobia in three sessions, if you need to. One, sometimes, with the right VR programming."

"If you can do this with VR, why did I drag my snake along on a starship? Him and a cooler full of frozen rats, which I took in place of the books listed on my allotment form, thank you."

"Because the recordings of the VR sessions aren't erasable."

"I thought you were the only one who got to see those," said Tess. "You know, make sure no one's having fantasies about running around with an axe or something."

I shook my head. "They've got people looking over my shoulder, trust me. After all, it would be pretty embarrassing if the mission shrink cracked up and nobody noticed."

"Or froze up and couldn't talk to the people we came fifty-four light years to see?"

"Yeah. Or that."

Dolphins have names. Not the ones we give them, but patterns of radar-click that they use to identify each other. No one's been able to figure out a language, but they can at least get as far as "Hey you." So the buttons by the pool at Ming Chu Oceanic Research said "Lucy" and "Desi" and "Gibson," but when you pressed one the underwater speakers put out a string of whistle-pop-squeaks that we'd recorded off of the kids. I pressed Lucy's button and two more buttons that lit up the symbols for "bring" and "ball." One of the silver-gray shapes circling in the water broke away from the others and made a beeline for the beach ball that was floating at the far side. I loved the graceful way she lifted it between beak and forehead and sleeked toward me, perfectly adapted to her environment. Ten feet from the poolside she lifted her front half out of the water, making circles with her tail to keep herself vertical. It was a trick you saw a lot in tourist shows, but as far as we could tell, she'd taught herself—for the simple reason that when she crashed down, the spray would drench whoever was in striking distance.

"Not again, Lucy, no!" I moaned as she tossed the ball onto no-longer-sodry land. She popped her head up wearing that eternal delphine grin, waiting for her reward. "Oh, all right. But we've really got to teach you a symbol for 'don't.'" I gave her a handful of herring from the fish bucket and tossed the ball away, earning for my generosity a second splash with her tail as she headed back to play catch with the other two. I turned to enter the trial data into the computer. I couldn't imagine how they used to do dolphin work when they had to keep records on paper—maybe they just remembered everything until they got away from the water. I used the mouse to highlight the next line of the spreadsheet, but when I started to type, I realized nothing from the keyboard was getting through.

"Bloody hell. Okay, kids, take a break."

I stalked all the way to the tech shop, but took a deep breath before I went in. "Jeff, you know how you swore to me that the new casing was waterproof? Can you explain that to the computer, please?"

"Oh, hey, Dr. Klein. These folks were looking for you." Jeff sounded like his usual laid-back self, but kept glancing at the three men standing stiffly by his desk. I could see why. "These folks" were, I kid you not, Men in Black. The dark glasses, I'll admit, were pretty sensible in southern Florida—the suits not so much. I had an immediate urge to introduce them to Lucy.

"Dr. Serafina Klein?" The tallest one held out his hand, and I shook it. He had a firm grip, very practiced, like a grant-writer or a used car salesman. "I'm Mr. Smith, and these are my associates Mr. Jones and Mr. Siegfried."

I blinked. "Siegfried?"

He was shorter than Smith and Jones, and very blond. In a perfect deadpan, he told me, "All the good names were taken."

"I can understand that," I said. "At Ellis Island they were handing out Klein like it was going out of style." No smile—these guys had faces as frozen as the dolphins—but I thought I detected a hint of humor in the tilt of the blond's head.

Smith cleared his throat. "We'd like you to come with us, please, Dr. Klein."

Peace protests when I was a kid. Petitions in college, too busy for anything else. No work more classified than some personality tests I'd helped write up for NASA. An ex-boyfriend had put me on the mailing list for an anarchist bookstore once, but they'd gone out of business years ago.

Jones must have caught a hint of what I was thinking. "You're not in any trouble, ma'am. Actually, we need you for some consulting work."

"Consulting work?" I repeated. Mentally, I kicked myself. Usually I at least *tried* to sound like a woman with a Ph.D.

"Nothing we can discuss further here."

They had a big black Ford that looked like it was probably also named Smith. I eased into the back seat and tried to settle myself in some way that didn't involve leaning against my wet clothing. After we drove for a few minutes, I asked. "So, can you tell me where we're going, or is it classified?"

Siegfried jerked his chin at Jones,

who was driving. "It's so secret, *he* doesn't even know."

Smith sighed. "Virginia."

"Virginia! But I'm not packed! And my work doesn't know . . . and Zawadi!"

"You'll get a toothbrush, the lab will be informed, and someone will feed your parrot. This is extremely urgent."

We drove on, and I worried.

We didn't actually, thank God, take the car all the way north. After a couple of hours we transferred to a helicopter, and then I got to feel even more like I was in a movie, and even more worried. None of the suits would tell me anything about this mysterious consulting job, although after a while Siegfried starting chatting with me about classic science fiction, which distracted me nicely. I was laughing at his explanation of FBI triffid control techniques (by the tenor of which I gathered that he was *not* FBI) when we finally landed.

The cluster of buildings around us was nondescript, but looked like it had been occupied for a while. There were a few more suits around and a lot of scientific types hurrying from place to place. Some of them were wearing actual lab coats, but most of them were wearing jeans and t-shirts. You could tell the specialty of lots of them because their shirts had obscure academic jokes on them. "And God said (long equation that I don't understand because I'm a psychologist), and there was light." That sort of thing. Everyone had these grins on their faces. They were all running around looking like they'd just come from a perfect first date.

"Have these people invented soma or something?" I asked Siegfried.

He still didn't smile, but I could tell it was an effort. "You'll see."

The office that they brought me into was more academia than government. The walls were lined with bookshelves, filled mostly with journals. I saw a set of *Aviation, Space, and Environmental Medicine,* which was where my NASA work had come out, and a pile of recent *Animal Behavior* on the floor. There was an old poster from a Godzilla movie, framed next to the desk. A tiny Spanish woman with black hair bound in a severe bun looked up as I came in.

"Dr. Klein, Dr. Estevan." My escorts faded to the back of the room as soon as Smith introduced us, but they didn't leave. I actually had met Zoe Estevan at a little space psychology conference in Kentucky, but it had been while I was a grad student, and I didn't expect she remembered me.

"I've been looking over your curriculum vitae," she said. "It's quite eclectic."

"My interests are broad." I tried not to fidget. I wasn't on the job market anymore, and didn't have to defend my "lack of focus" to anyone.

"Master's in clinical, another master's and a doctorate in experimental, publications mostly in animal behavior but a steady record of collaborations in space psychology. You're probably very tired of being told that it all looks pretty unrelated."

"I suppose it does," I said stiffly. I had indeed heard that more times than I cared to count, and I wished she would get to the point.

"I want you to take a look at this." She turned her flat-screen monitor around and showed me what looked like a bar graph with a whole lot of bars shifting constantly.

"It looks like the SETI screensaver that I've got at home, but less . . . embellished." The Search for Extraterrestrial Intelligence had been doing its initial analyses on private computers for years now. Estevan was smirking. "It's not the SETI graphic, of course. That's just what it looks like."

She pressed a key, and the bars became more of a pattern, steady and regular. Another press and the picture switched to a flow of 0s and 1s that transformed to black and white squares that scrolled up the screen in a radiated circle, then a Fibonacci sequence, then a set of primes . . .

"It's not," I repeated. "It's something else. Something that we're sending out?"

Estevan shook her head. "You had it right the first time. This is a SETI signal that came in four months ago."

"Oh my God." I heard the rush of blood in my ears, felt my heart pounding and my palms sweating. I realized I was crying and wiped at my eyes with shaking hands. "Oh my God. All my life . . ."

"I was right, then. Your studies haven't been random at all."

I shook my head. "I don't think anyone realized. There hasn't exactly been a lot of demand. I just decided if anyone ever came looking for a . . . for a xenopsychologist, I ought to figure out what they'd want, and meanwhile I'd work with dolphins or something." I took the tissue that Estevan handed me. "Thank you. Excuse me. I'll be all right in a moment. I'll be absolutely fine."

"It's okay. We've all been through this part." That smile I'd seen everywhere outside crept onto her face. "It's pretty incredible."

"Why hasn't this . . ." I glanced back at the suits behind me and shivered. "Are they going to *tell* people?"

She nodded vigorously. "Absolutely. The problem is how and what."

From behind me Siegfried added, "The problem is when."

"He means 'when' the signal is from, not 'when' do we tell people," explained Estevan.

My brain was beginning to come back online. "It's a SETI signal, so it has to be at least a few years old. Probably quite a few. I know the nearest stars were looked at years ago. I remember checking that out the fifth time I read a first-contact novel where they'd only just gotten around to Alpha Centauri in 2010 or so."

"This one's about fifty-four light-years away. And as soon as we received it we sent off the whole Arecibo sequence in their direction—they'll get that in a half-century or so. But after this message gets through establishing common principles, it starts sending through new information. Directions. Circuit diagrams."

My breath caught in my throat. "For what? Starships?" I stopped myself from babbling—I was not going to make an idiot of myself wondering about cancer cures and disintegrator rays.

That grin again. "We're still trying to put that one together. But the first set of instructions was for a communication device. It works through some sort of . . . well, I'm told it's related to quantum teleportation, but pretty far afield from what we've been looking at on Earth. Christoffels can give you half an hour on the physics of the thing without pausing for breath, and then you'll understand it about as well as I do." She took a pause for a breath of her own. "We knew what we had after a couple of days, which is why we didn't go public then. It took two and a half months to build, and then we spent six weeks establishing a basic vocabulary, getting terms across . . . The short version is that we've been talking with the Skaan in real-time for the past three days."

I spent three days of my own, poring over the transcripts. The Skaan were certainly alien—attested to by pages of frustrated exchange in which they tried to explain, or understand, mysteriously vital cultural points (I personally think the discussion of mating customs is right up there with Plato's dialogues). Overriding the frustration, though, was the sense that they *were* trying to understand. Our two species shared in the kinship of sapient curiosity and in the joy of speaking with an intelligence other than their own. That had always been my frustration with dolphins, with bonobos, with parrots. In the end, all they wanted to know about humans was what they needed to do in order to be fed. They never asked *questions*.

Finally, I sat down to my first real-time conversation with a Skaan. The exchanges were text only, both sides having realized early on that translation of print was easier and faster than translation of spoken language with all its individual variation. Lower bandwidth, too—and I'd been given to understand that the ansible was pretty expensive to operate.

Breathless, I typed: [Hello. My name is Serafina Klein.] Would "xenopsychologist" translate? I knew we were still working on vocabulary, and kludging the grammar by having a live person straighten it out at both ends. [I study Human psychology, but I have also trained to study non-Humans. I have waited a long time and am very happy to begin.]

I sat a minute, feeling the dopey grin on my face, imagining my words turned to electronic bits, hurled through the relay across the void, reformatted at the other end, reordered and conjugated by the Skaan linguist, and read by my counterpart. Then the process would be reversed. If anything comprehensible made it through that, it would be a miracle—but one that had been repeated hundreds of times in the last few days. I caught myself bouncing in my chair as the cursor blinked and moved.

[Hello. I bear the name Feese and am held by Aath and Quenshee. I also study the patterns of thought in all things that may bear sapience. I bear joy now, speaking with one who carries new patterns. Will you share in patience?]

Just before you open birthday presents, when you're little, there's the magic that *anything* could be hidden in front of you. I hadn't felt that way in years, but here it was again—only better. I blinked away tears while I typed. [I will share in patience and joy.] What to open first? [Let's start with what Human psychologists think of as the basis for patterns of thought. Tell me about the senses that you perceive the world with.]

[The most important are vision and light-shadow-heat. These interact and are often named as a single sense.] The words continued to flow, and I took notes, and asked questions, and gave Feese my own Intro Psych sensation and perception lecture. I would not have wished to be doing anything else, anywhere else, for any price.

Ten days in, I really wished that we were receiving visuals. I didn't even need motion. All I wanted was a neural diagram, the kind that you can get printed on a ten-dollar t-shirt if the brain you want sketched is human. Skaan brains, like ours, consisted of two hemispheres in whatever passed for a head—but Feese said they also had ganglia in the equivalent of their fingers, which did some of the initial processing before passing signals further up. These were somehow interconnected with each other, and I was beginning to suspect from some hints Feese had dropped that this made it easier for them to recover from brain damage. If I'd had a diagram, figuring the whole business out would have been so much easier. I grinned to myself as my own attempts at a model became increasingly covered with scribbles and cross-outs.

Unfortunately, I wasn't permitted to spend all my time on the Skaan. The other part of my job was to observe the human end of the interaction, trying to catch trouble before it started and being available if someone dumped it in my lap. Two weeks of ecstasy will wear people out almost as much as, say, two weeks of worrying about dissertation orals. I'd already dealt with one elderly biochemist who refused to get on the ansible for two days after the revelation that the Skaan scientific community was female-dominated, and two not-so-elderly research assistants who'd refused to talk to *him* after that. There had been a couple of Skaan names that dropped off the communications roster around the same time. I hadn't made any explanations to Feese, and she hadn't made any to me. Assuming I wasn't anthropomorphizing, I sympathized with the desire not to air dirty laundry.

I tried another sketch of possible neural network organization. Would this one work? It would depend on how efficient conduction was along the axons . . . another thing to ask Feese on our next date.

There was a knock on the doorframe.

"C'mon in. Siegfried, hi!" The third of my men in black, while not directly involved in the ansible work, had been doing some analysis on the transcripts—I think mostly because he had the time and wanted to. He waved jauntily enough, but then came in and sat hunched over in my armchair, arms crossed, looking at the floor. A moment later he straightened, meeting my gaze. Then his eyes dropped back to his hands. He shifted in his seat while I waited.

"What's going on?" I asked, as gently as I could. I had him pegged for either trying not to strangle one of the aforementioned elderly scientists, or for trying to work up the nerve to ask me out.

"What do we think we're doing here?" The words burst out, as though he had been saving them up. "How can we think it's all right to talk to them?"

I was disappointed, but kept my therapist face on. I wouldn't have guessed that Siegfried was repressing xenophobia. It was a natural enough response, I supposed. As much as we try to hold it down, fear of the Other goes pretty deep in the human psyche. "Why wouldn't it be all right to talk to them?"

More fidgeting. "Serafina, you know what I do for a living. I mean, you don't, actually, but you can guess the sort of things I've seen. Humans do things to each other, things that seem necessary, and maybe for us, for now, they *are* necessary." I nodded encouragingly, and he went on. "We're still in the sandbox, hitting other kids over the head with shovels. How can we think we're worth talking to? What are they going to learn from us? How to be stupid? We aren't ready for this!"

Okay. Not xenophobia after all. Instead, I had a case of low self-esteem, writ large. I felt relieved and a little guilty about it. "I do know what your work is, more or less. Can you tell me why you went into it?"

His lips quirked. "College ROTC and a lot of coincidences."

"That's all?"

"Well . . . I guess it seemed like a . . . noble thing. Serve my country and all that. Serve the world."

"And you've been doing that, right? Not everything you've seen has been bad." I was on safe ground there, I figured, given the last few days.

"Of course not," he said. "But that doesn't change the ugly parts. We only get one chance at this, and we're not ready."

"Why do you assume they are?" I leaned forward. "Sure, they talk about how important it is to be *usaalif*—what we've been translating as 'civilized.' But have you noticed they're mostly saying how important it is for *them?* After the whole gender roles discussion, there were people on both sides who disappeared for a while. I gather that they were as embarrassed as we were."

"Are you saying we can all be immature together? In a bigger sandbox, with more shovels? I'm not sure that's any better."

"I'm saying maybe we *can't* grow up until we have someone else to talk to. The same way you question your parents more after you see how things are done at the neighbor's house. Maybe we're stupid in different ways. Sure, there's a chance that we could all come out of this with some new bad habits, but I'm optimistic enough to think it's more likely that we can help each other. We all want to be *usaalif*, after all, right?"

"I do, at least."

"Everyone here does," I said. "When you make new friends, you want to imitate the things you like about them."

"Not always the best idea in the world. I picked up some pretty nasty habits in college, I remember." But he was meeting my eyes again and smiling.

"Probably. But the cosmic equivalent of frat parties has got to be better than hitting each other with shovels."

He laughed. "You can't have been to many frat parties. I'll bet you had some wild study groups, though!"

"Sort of a combination. Stats make more sense after a couple of beers, anyway. You going to be okay?"

He nodded.

"We'll make this work. We're as ready as we're ever going to be until we actually go through with it."

At three weeks, we had a mini-conference. Everyone gave a twenty-minute talk on what they'd learned, and then the rest of us tried to point out all the obvious questions they'd missed. It was a breath of familiarity, and I think we all needed it. Sure, we were running the first contact with an alien species, with no chance for rehearsal. Sure, we'd been having real-time conversations across fifty-four light years and completely revising our physics as a result. But as long as we could summarize everything in a computerized slideshow, we could handle it.

The physics people went first. I couldn't have told you what most of the talk was about, but the last slide was mind-blowing: a photograph of a scaffolded steel frame, half completed, and an inset of an engineering diagram. Dr. Christoffels intoned: "I see a long journey in your future," and the room exploded into applause.

Isham from bio was next. I'd been particularly looking forward to this part. I hadn't been able to catch up with him earlier to check my guesses about the Skaan nervous system, and was hoping to corner him during the question period.

"So," he began. You can always tell the professors who are recovered social phobics, because they still can't help stalling a little before they start talking. "I want to begin by giving you a bit of context. Last night we got our first and, given the cost of the bandwidth, probably last, visuals through the ansible." A low and eager whisper filled the room, and I leaned forward. Isham fingered his notes. "I should warn you that these are all stills, and the image quality is only fair. That said, however—"

He changed the slide, and I caught my breath. I clenched my fists, then forced them open. I kept my therapist's face on, bland and sympathetic, because I couldn't fake anything else. Fortunately, the people around me were too excited to notice.

The Skaan didn't really look *that* much like Terran snakes. Sure, they had long, coiling bodies, and scales, and those expressionless black eyes, and those lipless, noseless faces. They were also much larger, and had eyespots all along their bodies, and two lines of tentacles arching around their torsos, one just behind the head and one about halfway down. The tentacles looked nothing like hands. They looked like Medusa's hair, if Medusa had been a snake herself. They looked *wrong*.

I had come to know Feese, to think of her as a friend. I had stayed up late hashing out theories of comparative psychology with her, had chatted about her husbands, had imagined what it would be like to sit down to dinner with them. She couldn't be anything so repulsive. I *liked* her.

Five feet from Zulu, I focused on my breathing. Inhale and exhale, inhale and exhale, just like I'd practiced alone in my room. The snake was out of his cage, draped around Tess's torso. If only he would stay still, I thought, I'd be able to handle it. But he kept trying to crawl off her—toward me, usually—and she kept pulling him back. That meant touching him with her hand.

"How can you do that?" I demanded.

"What, this?" She ran her fingers along his back. "It's nice. He's got soft skin. Here, try it." She held out a scaly coil in my direction. I didn't pull back, but it took effort.

"I don't think I'm ready for that, yet."

"Come on. He's not slimy, you know."

"I know that," I said. He didn't even look slimy. My hindbrain, though, insisted that if I touched him, I'd come away fouled.

"So pet him. Pretend he's your friend's new hatchling." She made rocking motions. "Oh, Feese, what a cute little boy! Such lovely brown and black scales! Such itty-bitty tentacles!"

Bile filled my throat. "Tess, stop it. Now."

"A week, Serafina. We've got a week. Touch the damn snake."

I stood up. "I don't need you pushing me. This is my job; I know how to do it."

She snorted. "Yeah? Your client's got a deadline. You'd better start pushing her, or she's going to screw it up."

I left, cursing myself.

At around 0100, I came back to Tess's quarters. She opened the door in a plaid nightshirt, eyes still half closed.

"Oh, sorry. I didn't think I'd wake you up."

"Didn't want to, you mean." She swept out an arm. "Right this way to the chamber of horrors."

"The yawn ruins the effect."

She lifted the top off the cage, then eased Zulu up and over her shoulders. "Oof. You're a heavy boy. Don't squirm. That's right. I know, you were sleepy, too."

I eyed him nervously. "Don't you worry that he'll strangle you?"

"Nope. Rats are food; Mommy's way too big. You've just got to make sure you give him something else to hold onto."

I came closer. Inhale, exhale. Inhale. Exhale. I couldn't do it.

"Close your eyes," Tess said. Swallowing, I did so.

I felt Tess's fingers close gently around my wrist, guiding my hand forward. I tried to empty my mind of images and expectations and any connection between what I was about to do and what I would see if I opened my eyes.

I felt smooth skin, only faint grooves marking the edges of scales. "He's dry!"

"I told you that."

He was cool, too, like a stone wall or polished wood. Muscle flexed underneath as he moved. He really was soft—not like a cat, but more like . . . actually, more like a dolphin. This was strange, but I seemed to be managing. I opened my eyes.

The problem was that when I looked, there was still a snake in front of me. I pulled my hand away, trying to avoid the temptation to wipe it off. Zulu lifted his head and flicked his tongue at me, and I flinched. I backed off a pace.

"That went . . . better," I managed.

"It did, though," said Tess. She smiled. "If you keep this up for the next couple days, we might actually pull this off."

I shook my head, taking my eyes off of Zulu. "If not, I can always go dirtside wearing a blindfold."

One week later. Second shuttle down. First had been the people with status, the ones who needed to make fancy speeches and sign things. Second were the people that really mattered, the people who knew things and whose job it was to learn more.

We had been getting and analyzing visual and auditory signals since we hit the system border—enough work to keep me busy and to force me to look at what I was getting into. I'd barely had a chance the last two days to visit Tess, but I'd been getting my full share of exposure to the feared stimulus. I'd also been getting full exposure to Skaan dramas and music, cross-cultural debates, unspoken assumptions, and linguistic intricacies. I was high on exotic anthropology. My mantra, when I had time to practice it, was: *Being a xenopsychologist is more important to me than being a phobic. I am not going to lose the thing I love because of the thing I fear.* I had a picture of Feese with her family, printed out and secreted in my pocket in preparation for the actual meeting. I fingered it while I waited, trying to decide if I should look at it again before we left.

Second shuttle down, dropping through layers of white, edged in fire, atmosphere wailing around us. Adrenaline, the same adrenaline that ran in our ancestors' veins when they left the plains of Africa, heading north into the cold. Sweat and fear and joy, lust for learning and for survival. We were as ready as we were going to be, without actually going through this.

The air was warm and humid. Short, purple grass covered the landing field. On the far side, Skaan were waiting for us. These were to be our fellows, the scientists and researchers with whom we'd been speaking for these past few months. They were also, indeed, giant snakes. I breathed, tried to find one of them to concentrate on, so I didn't have to look at all of them. I glanced at the printout, looked for the semi-familiar face and scarlet-and-purple diamond scaling.

A Skaan who seemed to match the description dropped from its resting coil and slithered toward me. I stood still. Part of me was still frightened, but part of me was singing. I focused on that part. *I am not going to lose the thing I love because of the thing I fear.*

"Serafina?" There was no hiss to her voice: Her voicebox and thick tongue were as flexible as a parrot's.

"Feese." For most of our exchanges, we were still going to depend on translation aids, but I had worked hard to at least be able to say hello. In her language, I continued: "I bear joy at our meeting and hope for our greater learning together. I will share in patience, for the greater joy of both our peoples."

Up close, I could see how her body stretched and pushed together as she moved, waves of muscle passing down her torso. Like Zulu, but larger. "It is a pleasure to meet you." Not entirely to my surprise, she spoke in English. "We bear joy together."

She stretched one of her tentacles and wrapped it around my wrist. I closed my eyes. Her scales were cool and dry, like polished wood or a stone.

I opened my eyes and—for the moment, at least—I saw the thing I loved.■

Special Feature

How to Write Something You Don't Know Anything About

Richard A. Lovett

There is a fundamental rule of fiction that you'll find in virtually any writing primer: Write what you know. If we followed that to the letter in science fiction, though, the field would be dull indeed. No warp drives. No manned spaceflight beyond the moon. No time travel, antigravity, force fields, nanobots, artificial intelligences, alien life forms, laser cannons, e-brain implants, or virtual-reality headsets. How can you write what you know if the things you write about don't exist?

And yet, nowhere more than in *Analog,* science fiction writers are expected to sound knowledgeable.

How to do this is a perennial panel topic at conventions, and as a dual science/science-fiction writer, I may be approaching a record for the number of times I've been part of such discussions.

Science journalism is the art of writing things you don't know a lot about. If you really were the expert, you'd be the one with tenure, publishing in the journal of *It-Really-Is-Rocket-Science*.

I learned this two decades ago, early in my nonfiction career. Late in the first year in which I actually turned a profit at writing, I was contacted by a food- industry publication that needed a West Coast writer to attend science meetings and hearings on regulatory toxicology. Could I do it? Oh, by the way, the first hearing was tomorrow.

The pay was good—roughly the same for that first hearing as my entire year's profit to date—so I said yes. That led to a decade in which I bounced from toxicology to microbiology, biotechnology to analytical chemistry, nutrition to cardiology. I even wrote about regulatory standards regarding insect body parts in salads and the best ways to ferment sausages to kill *E. coli* bacteria.

At first, it was an exercise in terror. My science background was in astrophysics, which was about the only field I was certain not to be writing about. What I discovered was that it really is possible to learn on the fly, especially under deadline pressure. There were days when I had to file stories on only a few hours' notice, knowing they would be scrutinized by executives wanting accurate, technical information.

I quickly learned the first rule of science reporting: If you didn't understand it, it didn't happen. It's a good rule for any type of writing that stretches your knowledge, and it has only one true exception: It may still have happened if you can quote it exactly.

But woe to those who botch the quote. My trade publication once had to write a retraction that went something like this: "Somewhere between talk, tape, and type, the phrase 'type II diabetes' became 'typhoid diabetes.' We regret to admit that there is no such ailment."[1] Luckily, I wasn't the one who made that mistake, although I did fumble the nomenclature of mycotoxins in my first article in that field. Mycotoxins are the toxins produced by molds, and anything that ends in "-in" (I now know) is the toxin. If it ends in "-ium," it's the beastie that makes it. That can be a critical difference. In fiction, it's the type of error that draws "gotcha" letters.

Still, it's often better not to know too much about a field. Partly that's because another axiom of journalism is that (mycotoxins aside) it's almost always the things you think you know that will come back and bite you. Being unsure makes you a paranoid fact-checker, which (within reason) is good.

At least as importantly, experts are often lousy writers in their fields. That's because they don't realize what the average reader doesn't know. The nonexpert, who had to learn everything from scratch, is in better touch with the readers—and can draw on his or her own learning process in the writing.

During my trade publication days, I wrote as many as 250 articles per year. That taught me three critical skills:

- How to be a quick study;
- How to translate techno-speak into English; and
- How to acquire a working knowledge of diverse fields.

None of these can be acquired overnight, but they are skills, not talents. They can be learned. Here are a few drills to help you get started:

- Read widely. Go online, to the library, or to the science-fact section of *Analog*. Try reading the news section of *Science* or subscribe to *New Scientist* (a large-circulation British weekly that's also a good source of story ideas). Read about fields you know nothing about but find at least vaguely interesting (boring yourself won't do any good). Talk to friends about their jobs, hobbies, passions. Not only is this a good drill, it's also of practical value. A couple of years ago, a friend told me about his hobby of collecting American large cents. I'd heard of these old coins before but knew almost nothing about them. Sometime afterward, when I was looking for a setting for a science-fictional detective story, I remembered our discussion. The result appeared in these pages as "Numismatist" (April, 2006).
- Bore your friends. When I was a kid, I liked to explain my latest scientific interests to my English-teacher mother. I'm sure I severely tested her patience, but the experience taught me to how to boil the science down to basics and explain it in vivid analogies.
- Once you've learned about an arcane field, keep current. In doing this,

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[1] If you think this is only a problem with technical fields, consider the following laugher that appeared in *Newsweek*, early in 2006:

> *Correction: In the original version of this report,* NEWSWEEK *misquoted* [conservative Christian leader Jerry] Falwell *as referring to 'assault ministry.' In fact, Falwell was referring to 'a salt ministry'—a reference to Matthew* 5:13, *where Jesus says 'Ye are the salt of the earth.' We regret the error.*

the internet is your friend. Of course, it's also your enemy. When you've learned to tell the difference, you can be confident you're acquiring some expertise.

So far, this has mostly been about learning how to communicate science. But how do you incorporate this skill into fiction writing?

Obviously, one way is by increasing the accuracy of your info-dumps. If they've got to be there, it would be nice if they're correct. But stories, even the hardest of hard science fiction, are far more than info-dumps. Often the trick lies in explaining as little as possible. Then, you can sound like you know more than you actually do, while minimizing the chance of mistakes.

This may sound contrary to the spirit of *Analog*, but it isn't.[2] How many of us really understand how a cell phone works? Or a GPS receiver? With the cell phone, we have a vague idea that it's in radio communication with a network of towers, but how does it manage the handoff from one tower to another? That's a nifty switching trick that would have looked like magic fifty years ago.

If you'd been smart enough to think of cell phones back then, you could have written a fine story without knowing anything about the details of the switching. All you'd have needed would have been the idea of limited range, line-of-sight operation, and miniaturized equipment. The real story is the cultural one: using the cell phone to page your kids from the house to help carry in the groceries, using your spouse's cell phone to call your own because you can't remember where you put it, efforts to ban driving while talking, the frustration of listening to everyone's one-sided conversations.

To most users, technology is pretty much a black box. So it's perfectly acceptable to black-box it in fiction. As often as not, my characters don't know how their stuff works. I just try to make sure the rules are clear and let out enough hints for the reader to work out the principles to whatever level of detail he or she desires.

Recently, I wrote a story that needed a backpacking tent capable of damping outside noises so you could sleep through anything. It could also talk to you.[3] It was flash fiction, and I didn't want to waste words explaining. Besides, my protagonist wasn't going to be conversant with the technology. So I wound up with a very brief description: on the order of "she vaguely remembered the salesman saying something about the walls acting as a 360 x 360 speaker web for reverse-phase damping."

How does the tent work? Well, its walls probably have a surface something like an electrostatic speaker, so that the entire thing can generate sound, with some segments tuned to better reproduce bass or treble. It will probably need to be carefully staked or you'll get the equivalent of speaker buzz if a segment isn't taut. It's going to need a power source (I used a solar "net"—one of my own favorite don't-worry-about-the-details gadgets), and a computer chip to drive it. It will also need an interior sensor web so that the "reverse-phase damping" (whatever that is) knows the location of your ears at all times, because you're probably going to get some interesting interference nodes. And the tent is going to have to be made of some lightweight miracle fabric that can do all that while still being portable.

Would it have been better to say all

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[2] In fact, a variant on this idea is so deeply *"Analog"* that it has become known as "Schmidt's Law," based on editor Stanley Schmidt's advice that writers spend as much time as necessary working out the science of their stories—and as few words as possible explaining it. The official version is: "Know as much as you can about your background, and don't tell any more than you have to."

[3] The story appeared in the "Futures" section of *Nature* on February 2, 2006.

that? No way. The sentence about the rental agent was a bad enough mouthful.[4]

This example isn't a true black-box technology, because I gave some explanation of how it works, using the character's ignorance mainly to preclude a massive info-dump. For a truly black-box technology, consider virtual reality. We all have a fairly good idea of what it is and apply the term loosely to things that are unusually realistic, if not truly "real." But VR so powerful that we really would have trouble distinguishing it from the real thing? That's a different beastie, which is why writers invent headsets, helmets, implantable direct-to-brain data jacks, etc., etc. I tend to use a "neural inducer" because the term alone is enough to imply everything I need, and I can let it induce those nerves with whatever precision is necessary for the VR to have whatever level of verisimilitude the story requires.

That brings us back to GPS. Those gadgets are everywhere these days, and everyone thinks they know how they work. Most will probably tell you they triangulate on satellites in geostationary orbit. But that's not right. There's no direction finder; rather, the receiver works by detecting speed-of-light delays in incredibly precise timing pulses from the global positioning system satellites.

I've never had the nerve to write a story in which the characters not only don't know how a technology works, but have it wrong. I'm not sure it's possible because somehow you have to let the reader know the characters are wrong. But it's a tempting idea.

To summarize, my number one lesson about writing about future technology is this: If you don't know the details, figure out the basic principles and black-box it.

There is one critical caveat. Keep your eyes open for violations of fundamental laws of physics. If you're going to violate them, it's better to do so overtly, as with time travel or faster-than-light travel.

I had a discovery like this midway through writing a recent story, "Nigerian Scam" (October, 2006), when I realized that antigravity devices violate the law of conservation of energy. That's because you could use them to lift water into a reservoir, thereby generating power for free. This was a major "oops." To save the device, I needed a fanciful power source. I got one by having it work by "subducting gravitons into the interstitial matrix." I have no clue what that means. But it sounded good and showed that I'd considered the issue. Usually, that's all you need, especially when writing about a nonexistent science.

Here are a few other principles for doing fiction about subjects you really don't know:

- Figure out the rules by which your future-tech operates. That's far more important than the details of the science. If you need a hyperdrive, how fast does it go? What's its range? Are energy limitations a factor? Etc. As often as not, the needs of the story will dictate. Jerry Oltion's novel *Anywhere But Here* is interested in the anarchic effects of an inexpensive drive that would allow anyone to travel anywhere, practically instantly. Lois McMaster Bujold's Vorkosigan stories need a wormhole nexus with strategic choke points. Neither author explains their technologies in detail because the details don't matter.
- Make sure the rules are clearly stated or implied. Obviously, consistency is

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[4] I did worry about the technical accuracy of the phrase "360 x 360." That puts the speaker web on the floor as well as the walls, where it's not going to be much use since her sleeping bag will be on top of it. But if I said "360 x 180," I was going to have to explain this, so I figured the tent probably had pressure sensors that made it smart enough to deal with that, too. As mentioned earlier, it's often best to leave such details to the readers. Those who know enough about the field to wonder about such things also know enough to figure out their own solutions.

also important.

- Use details to enhance plot or setting. Television shows such as *CSI* have proven that people love to know how things work. But if the details aren't integral to the story, you may want to toss them off as quickly as possible, as the literary equivalent of set decoration.
- Even if you don't really understand the science, take time to think through the implications of your technology. That can drive your story in unexpected (and sometimes very good) directions. When I came up with the antigravity device in "Nigerian Scam," all I really needed was a technology that could make my protagonist rich. Anything would have worked. But once I'd settled on A-grav, I had so much fun with it that by the time I'd finished, I could no longer imagine the story with any other technology.

Whether you're working with an imaginary technology or in a field where you're not really an expert, you can mask your ignorance by mixing the science with nonscience. Not fantasy, but elements that would be at home in a mainstream story.

A good example can be found in Larry Niven and Jerry Pournelle's classic, *The Mote in God's Eye*. Embedded in a story that was very much hard science fiction was an Islamic character who stuck in my mind because he represented a culture I didn't know much about.

Such things are not only fun and interesting, but they provide a great way to write something that you really do know—a nice counterpoint to the areas where you're winging it. The excitement and realism from these elements adds to the reality of those you may have glossed over or black-boxed.

The most common way to add such detail is by making your protagonist a writer. After all, writing is something every writer knows. Unfortunately, this has been overdone. Unless the story really needs a writer as protagonist, it's also lazy.

In addition to writing science, one of my other specialties is profile writing. That has taught me that there's something exotic about everyone—probably several somethings. The trick is finding the ones in your own life.

For some writers, they involve setting. Mystery writer Tony Hillerman knows the Navajo culture better than nearly any other white. His stories, set on the Navajo reservation, would be fascinating even if the mysteries themselves were mundane.

I know the Great Basin deserts. In "Dinosaur Blood" (Jan/Feb, 2006) my protagonist takes a road trip that includes large pieces of Nevada. She could just as easily have gone to the Maine north woods, but I wanted her experience to be as real as possible.

I am also a distance runner and coach. It is no coincidence that my first *Analog* fiction sale involved a futuristic track star and a more recent one, "Original Sin" (June, 2006), used a cross-country coach. Cross-country running isn't a sport most people know anything about, so it provided a real-world anchor for the story's black-box science fictional elements.[5]

This brings us back to the old primer rule. Stories indeed work best if you write what you know, but you don't have to have expertise in everything. What's important is to ground at least some portions of the story in things you do know, even if they're just a bunch of what a friend of mine calls "grace notes" about cats, sagebrush sunsets, or life behind the counter at Starbuck's. Then, the rest of the story can work its magic.

In science fiction, we refer to that magic as "suspension of disbelief." ■

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[5] Nor am I the only one who does such things in science fiction. Go back through old issues of *Analog* and read the Biologs. Then look at those authors' recent stories. Odds are you'll find links.

The Taste of Miracles

Kristine Kathryn Rusch

What's a 'miracle'?
Depends on where you're looking from. . . .

Hayes stared at the vastness of space through the freighter's window. He swiveled slightly in the pilot's chair, wincing as he banged his knees on the control panel. No matter how many times he did this run, the sight fascinated him. Even the blackness looked crisp, and the points of light appeared sharp. Thousands of stars. Thousands of possibilities.

Trish brushed his shoulder. He turned, and she handed him a steaming mug. "Cocoa," she said.

He took it, feeling the heat through the durable plastic. "I didn't know we had chocolate aboard."

She smiled and eased in the chair next to his. She was as slim and battered as the freighter, her skin lined with the effort from all the years of hauling, lifting, and loading. He had called her scrappy until he had seen her in a fight with one of the ore miners in the bar at the ass-end of the moon base. After that, Hayes decided, "tough" was too wimpy a word for Trish.

"Needed a little something special tonight," she said, then blew gently at the steam.

He glanced at her, her small, strong hands wrapped around the mug as if it would give her warmth. "Didn't think you celebrated holidays."

Her grin was tiny. She didn't look at him. "Don't. Not really, anyway. But I kinda like this run on Christmas."

Earth to the Moon and back. One of the easiest runs on the freight line. He preferred Earth to Mars because he liked Mars better. It stirred his imagination in a way the Moon never did. "I like it too," he said. "Pays triple."

"No. I don't care about that." She slurped. The entire area smelled of hot chocolate. "You celebrate Christmas, Hayes?"

"I'm not religious," he said.

"I mean as a kid. You get to celebrate? Tree and tinsel and toys?"

"Shoppers' Mecca," he said, remembering the tree from his twelfth year. His mom shelled out for a Grow-Your-Own, the only way to get real trees then. It had been enormous, decorated with popcorn and ornaments generations old. The lights were miniature candles that appeared to be burning, and his parents had bought so many presents that the packages spilled across the living room floor.

"Was it fun?" She huddled in the chair, her legs drawn up to her chest, mug balanced on one knee.

He shrugged and thought. It had been so long since he had done the holiday thing. He was usually on some run or another, earning extra cash. "The anticipation was great," he said after a moment. "All month. The tree, the lights, the packages filled with surprises. The feeling that something magic could happen. That was fun."

She was staring at the stars, like he had, only her scarred features had a touch of wistfulness. "Never had any of that. The Shoppers' Mecca or the religious stuff."

"Never? Not even as a kid?" He regretted the question the minute he asked it. She had spoken of her childhood enough—in the program from the age of eleven, bounced at sixteen when she became too hard to handle after her grandmother's death, running freight ever since because she was strong and one of the best damn pilots in the business.

"Not the shopping. Not the religion." She finished her cocoa and set the mug on the floor beside her seat. "Christmas Eve, my gram would fill a thermos with hot cocoa, then she would bundle me up, take me outside, and when we were all snug in the snow, drinking our cocoa, she'd point to the stars. She'd tell me this story about how, when she was a girl, they had this race to get to the moon, and how, one Christmas Eve, those astronauts orbited the moon for the first time, and they sent holiday wishes to Earth."

"Apollo 8," Hayes said. "Borman, Lovell, and Anders."

"You know it?" she asked.

"Space history is a hobby of mine."

She nodded, still staring at the blackness. "Anyway, Gram thought it was a miracle. A real miracle. So every year, she went outside and pretended she could see them up there, circling."

"So that's why you do this," Hayes said.

She looked at him for the first time, her nut-brown eyes bright. He could almost see the little girl, bundled against the cold, holding her grandmother's hand and staring at the night-darkened sky.

"No," she said, her flat voice shattering the illusion. "We were born to late too be cowboys, Hayes, and there's no such thing as miracles any more."

She picked up her mug and straightened out her legs, then pushed out of the seat. Space was as dark as ever, the stars bright beacons of the future, waiting for him. But he would never go farther than Mars. He was a pilot who shuttled ore, equipment, and people from place to place. Not even allowed the glamour title "astronaut" anymore.

She had stopped behind his chair. He could see her reflection against the window as if she were standing in space, unsupported by the freighter.

"That's why I like this run on Christmas," she said. "I need to remember that once upon a time, this was the stuff of dreams."

She touched his shoulder, a fleeting warmth, a moment, dreamer to dreamer. Then she let go.

"More cocoa?" she asked.

"Yeah," he said, glad she had brought it along.

Before handing her his mug, he took one last sip. He stared at the stars, swirling the chocolate on his tongue, and savored the taste of miracles. ■

The Unrung Bells of the *Marie Celeste*

Richard A. Lovett

What do you do with a second chance—or a universe of them?

Life is a countdown to death. The thing that makes it bearable for most people is that they don't know when the clock will get there so they pretend it never will. But today, Wynsten Jones controlled the clock. When it neared zero, he'd say something pithy or ironic or just plain campy, push a button, and unless the engineers finally had it right, which he hoped they didn't, that would be the end of Wynsten Jones.

He'd been in control of the countdown once before, but not with the whole world watching. That time, he was staring down the barrel of a gun, trying to will himself to pull the trigger. But his Catholic upbringing had won out. He didn't really believe in an afterlife, but if there was one, the idea of consigning himself to an eternity of something worse than the present was just barely frightening enough to keep him among the reluctant living. Long enough, anyway, to find a way out that even his catechism teacher couldn't disapprove of.

That was when he volunteered for this mission. It might be the only job in the Solar System for which a suicidal psych profile was an advantage. Rather than shooting himself in a drunken stupor, he'd go out a hero, striving for the betterment of mankind. Hurrah for Wynsten, the bold explorer. Someone had to do it because maybe it would work and humanity would actually be bettered. And if humanity wasn't bettered today, well, the techies supposedly learned something from each failure. Although there was a nasty rumor that they'd given up and were merely making random changes.

Still, being failure n-plus-one was an acceptable way for a world-weary pilot to make his exit. Other than the fact that he welcomed it, was dying this way any different from the soldier who falls on a grenade?

Wynsten expected to be dead a split second after he pushed the button. And because everyone else thought so, too, they were letting him proceed at his own pace. It didn't matter how long he spent on the preflight checklist, because the launch window was basically "any time you're ready." All that really mattered was not to die stupidly, overlooking some critical telltale. Burned-out pilots were cheap. Ships weren't.

Now that he was truly and publicly consigned to death, he could wait. Let the ship kill him in its own mysterious way, as it had its previous pilots. At least, everyone presumed they were dead. Technically, they were simply missing. The first time, an entire ship vanished. Humanity's first faster-than-light drive, launched for somewhere in the vicinity of Saturn . . . never to return from hyperspace.

That first ship had been named *Endeavor*. When the same thing happened to its successor, the Space Authority had replaced the next ship's human pilot with a computer cube that happily delivered a cage of mice to Saturnine space, then brought them back. Alive, well, and oblivious to their epoch-making journey. Salamanders, goldfish, parakeets—all fared equally well. But cats and dogs were iffy. And humans always vanished. When they were given actual control over the mission, expensive ships went with them: the *Enterprise*, *Beagle*, *Santa Maria*, *Victory*, *Magellan*.

The current ship had never been formally christened, but the tech folks were calling it "Seven." As in *Marie Celeste 7*. Fitting, because like its namesake, it had a penchant for drifting crewless. Once, two people had been put aboard, just to see if that helped. It didn't.

The only reason this wasn't the *Marie Celeste 27* was that the Space Authority had gotten tired of losing ships. Now, "pilots" were little more than glorified passengers. Wynsten's only job other than riding a mostly ceremonial herd on his end of the checklist was pushing the launch button. After that, everything was automatic. If things went as before, the ship would indeed reappear . . . minus Wynsten. There was even an automated return that could be activated from long distance. Saturn might be the shortest hop the quantum drive could do, but it was a long way to tow a ship back to Earth.

So far, the testing program had been the worst kind of good-news/bad-news joke. The good news: FTL travel was possible. The bad: only for drones or mice. Not exactly a golden age of exploration.

In theory, Wynsten was free to back out any time until the end. But one of the reasons he'd gotten the job was that the psyches said he wouldn't. After the first half dozen disappearances, only glory seekers and suicides had been selected as pilots, and screening was good enough that none had bailed in the final minutes. The only thing Wynsten was afraid of was pain, and he figured that if there was any, it wouldn't last long. His immediate predecessor had been afraid of the same thing and had slipped an opiate-loaded asthma inhaler on board with him. Seconds before he reached for the launch button, a massive dose of pseudocodone was en route to his brain. Weirdly, he was the only pilot ever to survive the flight. But not by much. He barely managed to reach the launch button, was comatose moments later, and long gone by the time the auto-return brought him back.

Wynsten wondered what the engineers had made of that. He knew what Mission Control had thought: Before boarding, he'd been subjected to a body-cavity search that would have done a maximum-security prison proud. Hell, it had probably been borrowed from one. It was strange, though, that hyperspace treated a dying pilot the same way as a goldfish. That had to mean something.

Time was ticking down. All systems were go and the ship was ready to launch—if that applied to a silent, instantaneous disappearance from translunar orbit.

It was time for the ironic or campy comment. "One giant step," and all that. Except that he was the n-plus-one pilot, and nobody was listening except Mission Control, who'd heard it all before.

For that matter, Wynsten didn't have much to say. The psyches had made him repeat the true version endlessly; the press had mostly been concerned about how to spell his name; and now that the moment was here, anything else seemed kind of silly.

"Bye," he said, and pushed the button.

For a brief moment, nothing much happened. Then the hyperdrive twisted in an invisible dimension.

Briefly, it again seemed that nothing much happened. Then the stars winked out.

Time wrenched, shattered, and sparkled like uncounted fireflies.

Aboard ship, the universe divided. Suddenly, there was a multitude of Wynstens.

"That's weird," they managed to say to each other.

Then time shifted again and they flowed into a meta-consciousness, most of whose fragments had never even heard of the *Marie Celeste*.

"Don't be a such a wimp. It's perfectly safe."

Wynsten Prime was six years old, sitting on a dock, tossing lazy pebbles, and watching the ripples spread and intersect. It was hot and the Lake of the Ozarks was as torpid as Wynsten: its surface a dark mirror reflecting everything and nothing, its opaque waters nearly the color of his mother's coffee.

"C'mon," his cousin Olsen said again. He was standing at the edge of the dock, knees bent, poised to leap. "It's not like you can't swim."

Wynsten dropped a stone in the water and watched it vanish from sight.

"Don' wanna" he said, which wasn't quite true. The Missouri sun was nearly straight overhead, and however unappealing the water might look, it offered hope of relief. In the distance a motorboat whined, pulling skiers to an unknown destination. Back in the Topeka municipal pool, Wynsten swam like a fish. But here, who knew what terrors lurked?

To distract himself, he thought about the ripples. If the lake were big enough, they would go on forever, changing everything along the way, even if nothing but the ripples would notice. Sometimes, Wynsten felt like a ripple nobody noticed. Right now, his mother was probably still yabbering in Chinese on her satphone implant and his father was halfway to somewhere Wynsten had never heard of, having promised to be back by the weekend—though everyone knew he wouldn't. They called this a family reunion, but the only family Wynsten had united with were his aunts, uncles, and cousins, and right now the only one he really liked thought he was a wimp.

Wynsten watched Olsen take the plunge. His cousin leapt high and far and struck with a cannonball splash that disrupted the lake's surface far more effectively than any of Wynsten's pebbles. He disappeared, then broke surface, grinning. "Nothing to it! C'mon!"

Wynsten shook his head. He could be stubborn when he wanted.

"Oh, crap," Olsen said. "It's those stupid stories Uncle Billy told us last night, isn't it?" Olsen shook his head in a very grown-up way. "I tell you, he was drunk. And even if he wasn't, he's an idiot. There's no such thing as lake sharks. And," he continued from the vast superiority of third grade, "snapping turtles don't get that big." He grinned viciously. "They might be able to take a bite out of your weenie, but they sure as heck can't drag you under."

He splashed back from the dock in an energy-wasting backstroke. "*C'mon!*"

Wynsten shook his head. "Don't wanna," he repeated, though he knew Olsen had hit the nail on the head. Anything could prowl beneath that deceptive mirror-surface. That was the whole point: You couldn't see what was down there.

Olsen's expression shifted. "Wimp!" he spat, third-grader to the core. "It would serve you right if a turtle reached up on that dock and dragged you right in."

Panicked, Wynsten scooted back from the edge as Olsen triumphantly porpoised from the water, then arced underneath, headfirst.

A moment later, he shot back to the surface. "Eee-yi!" he yelled, thrashing wildly. "Something's got me!" Then he was below again, invisible except for roiling water and an explosion of bubbles.

Then all was still.

Wynsten glanced back to the vacation cabin, but his legs wouldn't move. He tried to shout, but nothing would come. It was too far, anyway; if his mother was still on the implant, she wouldn't even notice. He looked back at the water, *willing* Olsen to reappear, but everything was silent, without even a ripple to mark the progress of a shark dragging its prey off to the deeps.

Wynsten didn't know it yet, but it was one of the formative moments of his life. Decision points shifted and spun. Ripples spread. There were many forks, but two main branches.

Wynsten Prime stayed on the dock, huddled as far as possible from the dangerous waters, rocking and whimpering for an endless interval.

Wynsten '36.07.12:1314 leapt to the rescue. Not that he had a clue how to find his cousin, or what to do if he did.

The splash engulfed him and carried him deep. He expected to be eaten at any moment.

It was dark. Then he realized his eyes were closed. He opened them and now it was lighter but brown. He still couldn't see anything, so he flailed at random, hoping to touch something, anything that felt like Olsen. But Olsen wasn't there, and the need for air called him back to the surface. He broke with a whoop, treading water, frantically wiping drops from his eyes, filling his lungs for a second dive.

"Hey, squib," said a voice behind him. He spun, and there was Olsen, under the dock, holding a piling and floating on his back. "Gotcha good, didn't I?"

Wynsten found his voice, and yelled as only a six-year-old knows how, slapping water toward his cousin's taunting grin. Then all was forgiven. For the rest of the week, under the dock was their favorite escape from the sun.

At sixteen, Wynsten Prime was the geek to end all geeks. He probably could have been class valedictorian if he wanted, but the year before, he'd deliberately taken Cs in biology so he wouldn't add that honor to his list of socially ostracizing accomplishments. Such things might be great on college applications, but they were death on the social life.

What he particularly hated was physical education, which the Kansas Board of Education, in its infinite wisdom, had decreed to be a flab-fighting must for all high school students. Wynsten was scrawny, at no apparent risk of ever becoming a cardiac statistic. But still he had to either go out for a sport or take the classes.

His was a school in which football was king. In freshman PE he'd quickly discovered that if you couldn't go head-to-head with the big guys, you weren't worth much. If you didn't even want to attempt it, you were the worst kind of wimp.

There was one thing he was good at. He could run. It was probably the same genetic endowment that had made him a good swimmer at age six, though he'd never again gone in the water.

He'd used his running talent to escape PE, and now the coach was telling him he had the potential to be all-state. There was only one problem: Track practice ate into his study time. Everyone in Wynsten's family thought it was pointless. His grandfather had been a pioneer in green chemistry. His father now spent half his time on the moon, designing nanofilms for tunnel-habs. His mother was about as close to a sports fan as the family had ever produced: A couple of years ago, she'd helped a ski manufacturer design smart-waxes for the Juneau Olympics.

Being all-state was a ticket to a track scholarship at any of a number of schools. A-ing out the rest of his junior and senior years was the ticket to a chem degree at Caltech or MIT. His parents saw it as a non-choice: Any sane person would take the academics. If he still liked running, his mother added, he could always work for a shoe company. Lots of nanotech opportunities there. Sweat was for jocks. "Do you really *want* to be like all those football players?" she asked.

Wynsten Prime dropped off the track team. Chemistry wasn't his passion—history or music seemed like more fun—but he knuckled down and never took more than the required non-science courses. Nor did he watch the next Olympics. No sense taunting himself with things that couldn't be.

Wynsten '46.11.19:0241 said the hell with it. He could name a dozen track stars who'd gotten Ph.D.s or gone to med school. What was so wrong with an athletic scholarship? It didn't mean you weren't also smart. While he was at it, he took another deliberate C in advanced chem. And an A+ in history.

Wynsten Prime didn't go to either MIT or Caltech. About the time he was applying for college, the Nobel Prize in chemistry went to a professor at the University of Kansas, which was cheaper and a lot closer to home.

Not that having a Nobel Laureate in the program made much difference at first. Even for courses in his major field, most of his freshman and sophomore lessons were chip-lecture or AI tutorial. It wouldn't be until he was an upperclassman (and an honors one at that) that he'd have any chance to meet the great professor and maybe impress her enough for a letter of reference.

Maybe the chip-lectures and tutorials were part of why Wynsten Prime took it for granted that it was okay for a chem major not really to enjoy chemistry. It stood to reason that courses with real, live discussion sections, such as his general-ed requirements in English literature and social science, would be more fun.

Wynsten '49.10.23:0937 decided otherwise. First he changed his major to literature. Then he tried anthropology. Finally, simply because the schedule was convenient, he took a course in geology. Immediately, he was hooked. Geologists hike. It wasn't quite as good as running, but it was a damned close substitute.

Wynsten Prime was staring at a raven-haired vision sheathed in sweat. Though he supposed that wasn't the best way to think of it. Horses sweat. Men perspire. Women glow.

In which case this one was radiant.

She was the perfect human animal. He'd seen her before, working out at the indoor track where he ran daily in the hope that the exercise would shake loose the creative juices on his Ph.D. work in synthetic nanochem. She'd been there all winter, and from the start, he'd been fascinated.

She ran alone and looked to be about

his age. That meant she wasn't on the track team. But she must have run somewhere as an undergraduate. Or maybe she was a triathlete. She was a big girl for a runner: not fat but muscled. She liked crop tops that revealed toned abs, and there was definition in her shoulders and legs, but curves where you wanted them. He'd clocked her once, pounding out 200-meter repeats: thirty-four seconds, again and again and again. College-star pace, but not Olympic level. Once upon a time, he'd been able to do thirty-ones. But not now. These days, he was just a fast jogger.

He was supposed to be letting his subconscious chew on his thesis problems, but she was too much of a distraction: a distraction, though, that he very much appreciated. At first he saw her only on Tuesdays, but he varied his schedule and was rewarded to start finding her on Mondays and Thursdays, as well.

Watching her felt like being fourteen at his first high-school dance. She moved with the grace of a gazelle, barely seeming to touch the ground between strides. At night, she floated through his dreams. But it was freshman year in high school in more ways than one, because he never spoke to her and averted his eyes if ever she glanced his way.

Everything that attracted him to her also intimidated him. Partly, it was a matter of height. She was tall: perhaps 5'9" to his 5'7". But she was also wondrously, vibrantly alive. He was a wimpy nerd. What on earth would she want with him?

December and January passed without a word. Then February and much of March. Crocuses were pushing through a late snowfall on greening grass. Any day, she'd be running outdoors and he'd never see her again.

Already, he could taste the regrets. Not from not being with her, but from not knowing. He'd done that before; he'd do it again. It was the way of shrimpy nerds. This woman had to be out of his class.

Then he cut a corner a bit close as she was buzzing by in the inside lane. Or maybe she swung wide. Whatever the cause, they clipped elbows.

"Sorry," she called over her shoulder, generous in accepting blame. It was the first time he'd heard her voice, and it resonated in her wake like a carillon of bells.

A hundred meters later, he caught her at the end of her speed circuit. "My fault," he said, afraid even to look her way.

He jogged a few more paces. But it was now or never.

Quantum-mechanical dice rolled. Wynsten Prime kept jogging. Wynsten '56.03.21:1648 came down on the lucky side. Heart pounding from more than exertion, he turned back.

"Hey," he said, "you're really good. My name's Wynsten . . ."

Wynsten Prime was feeling good. He kicked high and with the toe of his dress shoe, lightly tapped the button for the twenty-first floor.

Even before he'd regained his balance, he knew he'd made a mistake. His date's name was Grace, and she was a stickler for decorum.

"Do you *have* to do that?" she asked, with an edge that said he'd better give the right answer. He'd been in an exuberant mood; today, his final experiment had at last worked, and all that lingered between him and a Ph.D. was the drudgery of writing up his findings. Barring disasters, he'd soon be Dr. Wynsten.

In the back of his mind, he'd known that Grace wouldn't like high-spirited karate-kicking of elevator buttons, especially in her apartment building, where neighbors might disapprove. Even though he'd managed to hit the right button on the first try.

"Normal people don't do that," she said, the edge to her voice increasing.

He'd met Grace the previous spring. May 2, she'd happily tell you if you asked for details. He'd been heading for the lab, and he'd had an inkling the bus was just around the corner. Not that he believed in ESP. What he believed in was Murphy's Law. If you sprint, the bus is miles away. If you don't, you regret it. Whatever decision you make, it's usually wrong.

It was a muggy day, and Wynsten '56.05.02:0739 didn't want to arrive at the lab sweaty, so he walked. Of course, that meant the bus was right there, but by the time he saw it, it was too late.

Wynsten Prime didn't really expect it to make a difference, but he ran. To his amazement, the bus appeared and he caught it with barely a second to spare. There was only one empty seat and two stops later, he offered it to Grace.

It had only been weeks since he'd missed his last chance to talk to the runner. Attractive women still intimidated him, but Grace was short, brown haired, and emphatically not an athlete. She also turned out to be working on her own Ph.D. in quark mechanics—a field she never quite managed to explain at any level where he could fully make sense of it.

Needless to say, his parents loved her. There was some pun involving her name and quarks, but he'd never quite understood that, either. What he did know was that she hated puns. "The lowest of lowbrow humor," she called them, instructing him never to make them in her presence.

Obviously, kicking elevator buttons was also out.

Vaguely, he knew he was facing a decision: conform, for Grace, or deliberately nonconform because he'd never quite managed to do so before.

Wynsten '57.01.13:2243 told her to take a hike. Then he kicked the elevator button again for good measure.

Wynsten Prime conformed. "I'm sorry," he said. "I wasn't thinking." Then, in an odd effort at appeasement, he blurted out something he'd been debating for weeks. "Will you marry me?"

* * *

The marriage lasted seven years, which was about five too many. Ultimately, it was Grace who dumped him, at about the time it became clear his tenure committee was going to do the same.

Even from a marriage that never should have been, divorce hits hard. So does denial of tenure, whether or not it's in a field you particularly like. Even when you only sought the academic big-time because it's what "normal" Ph.D.s do.

Wynsten could have filled out his years as an aging lab tech, but he couldn't tolerate the pity. All he wanted was to lick his wounds and hide. So he mechanically voiceprinted all the docs Grace's attorney sent him, cashed in whatever assets she left him, and headed for the far side of the globe.

He fetched up in Diego Garcia. It wasn't quite directly opposite from Topeka, but it was close enough: undemanding, tropical, and smack-dab in the middle of the Indian Ocean. It was also one of the Space Authority's tracking stations.

Several Wynstens between '65.03 and '65.04 went native—or as native as you can go on a decommissioned navy base, now run by the Space Authority.

Other Wynstens, from '65.10 to '65.11, discovered that six months was about as much island life as they could take. At thirty-five, they were a bit old to go back to college, but there were lots of things they could do that had nothing to do with chemistry. They set off to Australia to find them.

Wynsten Prime hung around Diego Garcia until the money ran out. By then he'd become drinking buddies with a couple of Space Authority techs. One thing led to another, and after he proved he could sober up when he wanted, the Space Authority checked his psych profile. Self-destruction wasn't yet part of it—that was still years away. Besides, his sense of duty was off the chart. Soon afterward, he was offered a job catching ice balls from the Outer System.

It wasn't as glamorous as it sounded. The real work was done by specialists who intercepted comets and chopped them into bite-sized chunks. Then they fused the chunks into bergs that wouldn't break up under thrust and coated them with reflecting film to keep them nice and cold. Wynsten probably could have snagged a billet with one of the Outer System teams because much of the fusing and coating was nanochem and, tenure or not, he was a good chemist. But if he'd actually enjoyed chemistry, tenure wouldn't have been a problem in the first place.

Berg-catching was the better job for loners. You flew out to about the orbit of Jupiter, mated the tug to the docking slot left by its Outer-System counterpart, hooked up to the waiting reaction-mass cistern (also created in the Outer System), and rode a slow arc to the delivery point: generally L5, but sometimes lunar orbit, where bergs made handy refueling stations for deep-space launches.

Anyone could pilot an ice tug. Mostly the job was just a matter of babysitting computers and providing a human presence for the folks back home to boss around on the off chance anything went wrong.

The only real responsibility was not to botch a trajectory and threaten Earth or any other human hab. If you did—or even looked as though you might—some fast cruiser would be there quick to makes sure you didn't. But unless you were a real terrorist, the tug computers were way too sophisticated to let that happen, and the actual mechanics of the job weren't any different from a million-and-one computer games. Except that, coupled to a comet-berg, tug thrust is about a bajillionth of a gee, and everything happens in incredibly slow motion.

Boring barely began to describe it, which was why tug pilots were always in demand. Worse, the job gave you way too much time to think. As his ship nudged mirror-bright blocks of ice through the uncaring black, he dwelt increasingly in the land of what-if, where roads not chosen tortured him like the sharp diamond-pricks of accusing stars.

And now, as the hyperdrive twisted toward Saturn, an unanticipated side-effect had shown him the answer to every what-if he'd ever pondered—plus a myriad more he'd never thought to ask.

The *Marie Celeste* was nearing its destination. In a timeless interlude that was not a time (and never could have been) Wynsten had been many things.

He had been the bold child who dove among the lake sharks.

He had studied music, history, and English lit.

He had made all-state, in track.

He had been even better at swimming, leading a relay team to an Olympic medal.

He had found lasting love with the glistening runner-girl.

He had done a Ph.D. in the wilds of Kamchatka and gotten tenure . . . in geology.

He had missed the bus . . . and Grace.

He had gone to Australia and wound up a lab tech after all . . . in the endless glistening wastes of the Australian Antarctic Territory, where a man could think, but the thinking was good because it made you a poet.

He had been wealthy as Croesus and an Indian Ocean beach bum; he had lived in post-apocalyptic monasticism and among the most amazing could-have-been technologies. There was even a Wynsten whose Space Authority had figured that as long as it had an FTL ship, it might as well get pictures from places like the Crab Nebula, even if the pilots didn't come back with them.

Ironically, the only choices that were impossible were the ones that gave Wynsten Prime what he thought he wanted: where he tried too hard to catch the bus and stepped in front of it, or fell off a cliff, or pulled a suicidal trigger.

In the world beyond hyperspace, the trip to Saturn was over in a heartbeat. But in that briefest of infinite interludes, Wynsten realized he could choose which of these lives he wanted to have lived. He couldn't start over, but he could ring any bell that had not been rung—unring any that had been.

There was also time, in that world beyond the heartbeat, to think about mice and goldfish, opiate-drugged pilots and vanishing ships. Grace had once told him about Schrödinger's cat, which was neither dead nor alive but half of each until quantum mechanics determined which would be the case. Now, the *Marie Celeste's* hyperdrive had temporarily pried open the quantum choices, and it didn't take a genius to figure out what had happened to his predecessors. They had found something better, leaving their ships to carry on without them.

Wynsten was tempted to pick the runner-girl. Or the Olympic medal. There were plenty of women along that line, too. But as the timeless interlude of hyperspace stretched before him (but did not), he feared that none of these options would truly save him. Not unless he himself also changed.

Wynsten's best selves had chosen to be bold, resistant to pressure, not "normal." If he stepped into one of the worlds they had created, would he *be* them, or simply have a new life to screw up? Either way, the future was what he needed to control, not the past.

He was the n-plus-one pilot. That meant that n before him had succumbed not to other people's expectations, but to temptation. Wynsten's sense of duty was still off the chart. For once, he could be both dutiful and different.

In the fading moments of that endless interlude, which was not a time but could have been anything, Wynsten felt the stark, cleansing glare of Antarctica, tasted the warm breath of the woman whose love could no longer be. And then, slowly, it faded.

The ship winked into existence precisely on schedule, and Wynsten found himself looking at the underside of Saturn's rings, gorgeously illuminated by high-angle sunlight. He was surprised to be alive but, even more surprisingly, not as disappointed as he would have expected. He couldn't remember much of what had happened in hyperspace, only that somehow he had chosen this and that that choice was the key.

He might be on an FTL ship, but it still used old-fashioned radio. He could push the return button and be back long before any message could get there, but if there was ever a time for the campy or pithy remark, this was it. Already the computers had found their bearings and were preparing to send the life-support telemetry: the amazing news that he was the Solar System's first successful hyperpilot.

He hadn't exactly rehearsed this speech, but given his farewell message, there was only one choice.

"Hi," he said.

Then he settled back to await the reply. They'd probably want him to come straight home for a boatload of tests. But he wasn't sure how much that would help them because for some reason he suspected that hyperpilots were a rare breed.

Meanwhile, he felt the stirrings of something he'd not felt for a very long time—so long that it took quite a while to realize that it felt amazingly like a hint of tranquility. Maybe it was just the setting, which was wondrously more interesting than watching reflected images in an ice ball. The rings were a sight to take his breath away, vaguely reminiscent of Antarctica, which was strange because he'd never been there.

Then came another odd thought. *Next time, I want to go to the Crab Nebula.* ■

If Only We Knew

Jerry Oltion

Uncertainty we have always with us, but some have a good deal more than others. . . .

When the ultrasound technician gasped in surprise, Robert knew something was amiss. He'd already begun to suspect that echocardiograms weren't standard for life insurance applicants, despite Dr. Sorenson's good-natured assurance that this was "just a routine check to make sure everything's where it ought to be." Something in the doctor's voice had rung hollow, and now the technician's little gasp confirmed it.

"I don't like the sound of that," Robert said.

"It's all right," she replied automatically. "I mean, it's, well . . . could you lean a bit more toward me? Thank you."

She had been holding the probe against his rib cage just below his left armpit, and he had been trying not to flinch at the way it tickled against his bare skin; now she slid it an inch or two toward his nipple and looked up at her monitor again. Robert craned his neck to see the image, too. It was surprisingly sharp, a black and white motion picture of his heart beating in real time, the chambers pulsing rhythmically and the valves flapping back and forth with each contraction. The technician pressed a key on the keyboard below the monitor and the image froze for a second—apparently she had just taken a snapshot of his heart—then she moved the probe down his chest, and the plane of focus slipped down with it from the top chambers into the bottom ones, then past another set of valves into the . . .

"Aren't there supposed to be just

four chambers?"

She nodded.

"So, is that some kind of reflected signal, then?"

"I don't think so." She took another snapshot and moved the probe down under his armpit again. "Take a little breath and hold it, please."

He did. The only sound in the room was the ultrasound unit's cooling fan and his own heartbeat, increasing in tempo. The screen showed three distinct chambers in a row, each with little tunnels in the walls: presumably arteries and veins carrying blood to and from the rest of his body. The technician recorded that view, then slid the probe farther toward his back, and three more chambers slid into focus beside the first.

"I've got a six-chambered heart," Robert said.

The technician recorded that view as well, then lifted the probe away from his chest. The image on the screen washed away in static. "That appears to be the case."

"How, uh, how common is that?"

Her expression as she looked down at him on the examination table—like a B-movie heroine trying desperately not to scream as the monster rises out of the swamp—made him wish he hadn't asked.

"Just a moment," she said. She stood up, her stool rolling back to bump against the wall beside the door. "I'll go get the doctor. Don't go anywhere."

She slipped out and closed the door behind her, leaving him alone with the ultrasound machine and his own astonishment. He hadn't really expected to find any trouble today; he was only there to qualify for life insurance. He was twenty-four and had never been seriously ill, and until a few minutes ago he had never felt better. He and Elaine had been married for six months, and they were deliriously happy to be so; happy enough to decide to start a family soon. Hence the insurance. He wanted to make sure she and the children would be provided for if anything happened to him.

The ultrasound probe dangled near the floor where the technician had left it. Robert pulled it up by its cord and examined the business end: just a smooth gray surface, slightly rounded so it would slide over a person's skin, and covered with conductant gel. The stuff smelled faintly of shampoo.

He pressed the probe against his side where the technician had been holding it and was rewarded with a fuzzy image of his heart on the screen. He pushed more firmly and the image cleared up, so he traced the six separate heart chambers again. He found what he assumed to be his aorta rising from the top chamber and followed that as it looped around and headed downward, but he couldn't see it behind his heart so he moved sideways and followed his pulmonary arteries into his lungs. He couldn't actually see his lungs, but he could see the arteries branching out into smaller and smaller clusters, except for the one that led to the cylindrical blob directly beneath his breastbone. He wondered what that was. He had a fair grasp of anatomy from high-school and college biology classes, but he didn't remember any cylindrical organs between the heart and the lungs.

Nor the doughnut-shaped thing just below that. The conductant didn't spread far enough to let him get a good image of it, so he took the bottle from its holder next to the monitor and squirted a dollop of gel on the probe, then tried again. It was cold at first touch, but it warmed quickly, and the image was much better. Now he could see the striations running around the doughnut, like strips of muscle or gill slits or radiator plates or something.

The door opened again and Dr. Sorenson entered, with the technician hot on his heels. The doctor was at least two decades older than Robert, his hair going gray where he hadn't already lost it, and he wore a frown as comfortably as he wore his lab coat. Robert nearly dropped the probe, instinctively expecting to be scolded for playing with it, but the oddity of the situation overwhelmed his normal reaction, and he managed to keep the probe centered on his chest.

"It's stranger than you thought," he said, nodding toward the screen.

The doctor found three more unidentified organs and several anomalies in Robert's liver, kidneys, and intestinal tract. Robert had stopped looking at the screen after a while, just lying back on the exam table and listening to the doctor and the technician exclaim in wonder at each new discovery. He hardly felt the probe against his skin anymore, even when the doctor slid it along his sides. Elaine couldn't touch him there without provoking the giggles, but there was no danger of him giggling now.

"How can this be?" he asked.

"It's obviously some kind of mutation," the doctor replied without looking at him. "Did your parents work in a chemical plant or a nuclear facility before you were born?"

"Mom's a schoolteacher," Robert said. "And Dad's a car salesman. Besides, a mutation this extreme would have left me dead during gestation. This is a whole sequence of changes, not just one flipped bit of DNA."

"Mmm." Dr. Sorenson rocked the probe back and forth across Robert's breastbone. "I'd like to get some x-rays. There's something odd about the rib cage as well."

Not "your rib cage," Robert noticed. Already it was "the rib cage." He raised up on his elbows and faced the doctor. "I'm not sure I can handle any more today. This is a bit of a shock, you know."

"Yes, yes, of course," Dr. Sorenson said. He lifted the ultrasound probe and set it on the equipment tray beside the monitor. "I'm sure it would be. It's, uh, certainly not what you expected when you came in, is it?"

"No."

The doctor pushed a button on the machine's keyboard, and an image of Robert's six-chambered heart popped up on the monitor again. He pressed the key a few more times, cycling through the snapshots he and the technician had taken. "The good news is, you're apparently in fine health despite all these . . . anomalies. Whatever their cause, they seem to be working together as well as the standard equipment."

"You'll certify me for the life insurance, then?"

The doctor frowned. "I'm afraid I couldn't do that. Not without a great deal more information." He paused, looking from Robert to the technician and back. "You, uh, never had any indication that something might be different? Special abilities, or different range of hearing, or . . . I don't know. Anything out of the ordinary?"

"You mean, can I leap tall buildings in a single bound? I'm afraid not. My hearing has always been pretty good, and my eyesight is 20/15, but that's about it. I'm not any stronger or better at sports than the average guy."

"How did you do on your SATs?"

"Huh?"

"Your college entrance exams."

"Oh. Okay. Pretty well, actually. But I'm not a genius."

Dr. Sorenson clicked his tongue a couple of times. "I'd like your permission to show these results to a couple of specialists, see if they've ever seen anything like this before. There may be some precedent I'm not aware of."

"No," Robert said. "I mean, not yet. I just—" He lay back on the table. "Once this gets out, I'm not going to get a moment's rest. The AMA is going to get involved, and the CDC, and maybe the FBI and the CIA and who knows who else? I wouldn't be surprised if the INS got in on it."

"The INS?"

"Immigration and Naturalization Service. They could argue that I'm an illegal alien. Right now is a really crappy time to be different in America." A bead of sweat ran down his forehead toward his left eye. He wiped it off, then held his wet hand awkwardly above his chest.

The technician had been standing beside the doctor, looking over his shoulder and staying out of his way. Now she picked up a towel from the equipment tray and handed it to Robert. "You can use this to wipe off the gel, too," she said.

"Thank you."

The towel was institutional white and scratchy, but Robert took it gladly and began rubbing at his chest and sides. He sat up and said to the doctor, "I'd appreciate it if you didn't let the insurance company know about this, either. Just tell them I don't qualify."

The doctor considered that for a moment, then nodded. "All right."

"The longer you keep this to yourself, the more we'll both learn about it," Robert told him. "The moment this blows up on us, we'll both be out of the loop."

"Oh, come now." The stool squeaked as Dr. Sorenson shifted his weight. "You're talking like this is some kind of threat to national security. You're a medical curiosity, certainly, and if we can learn how you got to be that way we might gain some insight into how the human body works, but you're hardly a menace to society."

"Tell that to the Homeland Security guys when they come to take me away. But until then, word of this doesn't leave this room. Is that clear?"

"Yes, but it's unnecessary. You're overreacting."

"Maybe. I hope you're right. But for now I want to play it safe."

Robert finished wiping off the conductant and dropped the towel on the exam table's paper cover, then stood up and took his shirt off the peg by the door. The technician turned away, apparently trained to give patients their privacy when dressing and undressing, but the doctor didn't care. He watched Robert pull his t-shirt over his head, obviously looking for anomalies in his bones and musculature as well.

"Will you come back and let me take some x-rays?"

Robert tucked the shirt into his pants. "In a day or two. Right now I just want to go stare at my navel for a while, okay?"

Dr. Sorenson took a deep breath, then quietly said, "Okay."

Robert let himself out. The technician was still looking away.

Elaine didn't get off work at the bank until five. Robert should have gone back to his own job at the bookstore, but he drove home instead and called his boss and told her that he wouldn't be in today. Then he opened a beer and sat at the kitchen table and looked out the window into the back yard until the beer was gone.

The wall clock read three fifteen. It would be four fifteen in New Mexico. School had been out for forty-five minutes. He picked up the phone and dialed his parents' house, and his mother answered.

"Is everything all right?" she asked when she realized who was calling in the middle of the afternoon.

"I don't know." And he told her what he had learned.

He had expected her to say—had desperately wanted her to say—"I had no idea," but instead he heard the creak of a chair as she sat down hard, and then she said, "Your father and I argued over whether or not we should tell you."

"Tell me what? That we're from Alpha Centauri?"

"That you were adopted."

"Oh, Jesus." Of all the explanations he had hoped for, that was the farthest from the one he wanted. It was no answer at all, and it left him even more alone than before. "Do you know who my re—my biological parents are?"

"No. The adoption agency didn't give out that kind of information."

"Can we find *out* who they are?"

"I don't know." She took a couple of deep breaths—he could hear her exhalations into the mouthpiece—and then she said what he'd wanted to hear all along. "We didn't know there was anything different about you. The doctor said you had a heart murmur, but it didn't seem to cause you any trouble, so we didn't pursue it. You were just a healthy baby. That's all we wanted, and all we cared about."

"But you decided not to tell me I was adopted."

"You were ours. We talked it over and decided that it was better not to confuse you with the idea that you weren't our natural child. Children are so sensitive, and we didn't want you to think we—"

"Mom, I'm twenty-four. You could have told me anytime in the last ten years. Well, maybe the last five."

"Maybe. By then there didn't seem much point in dropping a big surprise on you." Her voice was growing husky as she tried not to cry. "I'm sorry. We didn't want to hurt you."

"You didn't hurt me." The truth of those words lifted a little of the weight off his mind. "Honestly, that's not the issue here. In fact, at least it helps explain how I could be so different inside."

"I suppose." She sniffed. "Does the doctor think you're, you know, okay?"

"As near as he can tell. He doesn't really know what to make of it, either. I'm going to go back for some more tests just to make sure, but I feel all right."

That seemed to calm her down a little. His health and happiness were her primary concerns. They talked for a while longer, and he felt better by the time he hung up, but he could imagine the night she and his father would have after she told him. Probably like the night he and Elaine would have.

He didn't bring it up as soon as she got home. He took her jacket and hung it on the coat rack, and he asked her how her day went, and he waited until she asked about the doctor appointment before he told her.

She smiled. "Well, that would explain a lot of things."

"Like what?"

"Like why we never do things the same way. You really are from another planet."

"You think?"

"I think you're playing a rather silly joke, is what I think. Seriously, how did it go?"

"I am serious." He looked straight into her green eyes. "Nobody wishes this was a joke more than I do, but it's not. I poked around with the ultrasound machine on my own when the technician was out of the room, and it's real."

"Wow." She put her arms around him and pulled him into a hug. They stayed like that for quite a while before she released him and stepped back. "So do you think you're really . . . an alien?"

"There's got to be a more believable explanation." They were standing in the kitchen. He got another beer out of the refrigerator, pulled off the cap with the opener he'd left on the counter, and gave the bottle to Elaine. "I mean, it's a little hard to believe that space aliens just dropped me off at an orphanage in Santa Fe."

"Maybe you got lost. Wandered away from the ship while the adults were taking biological samples or something."

"That's just about as hard to believe."

He watched her sip the beer, watched her swallow. Did it taste the same to her as it did to him? Did she see the same color when she looked at the bottle? Did she see *him* the same way she had seen him a few minutes ago? How could she? They were having at least a quasi-serious conversation about the possibility that he wasn't human.

"The doctor thought it was mutations."

She considered it, but not for long. "Naaaah. The odds of that many things changing all at once and still producing a healthy person are practically nil."

"Yeah. That's what I said, too. But that doesn't leave us much else to work with."

"A genetics experiment?"

"Twenty-four years ago? We can barely clone a sheep even now."

"Hmm."

They talked it over all evening, but by the time they switched out the light and went to bed they were no wiser. Robert lay on his back and stared at the ceiling, half expecting the darkness to explode into the flashing blue and red lights of police cruisers as the government came to take him away for interrogation, and half expecting the otherworldly brightness of a Spielberg mothership come to take him home. Elaine lay beside him with an arm draped over his chest, no more asleep than he, but neither of them spoke. There was no more to say.

Morning came with the surreal realization that nothing had changed. Something should have, Robert was sure. A person didn't discover surprises that earthshaking about himself and then just go on about his life. But he had work to do at the bookstore, and he couldn't really leave his coworkers in the lurch simply because he had an existential crisis. And Elaine was just as needed at the bank.

He got through the day on automatic. By mid afternoon, he surprised himself by forgetting about it for whole minutes at a time, but he spent his breaks in the biology and medicine sections, looking for books that might shed any light on his situation. He didn't have any luck.

He called Dr. Sorenson's office that afternoon and made an appointment for the next day. Elaine went with him this time, and they spent the whole afternoon in the radiology lab while Robert underwent x-rays, CAT scans, and MRI scans of every inch of his body. Dr. Sorenson burned dozens of DVDs of data, and he once again asked Robert to sign a release allowing him to share the information he had gathered with specialists who might know more than he did, but Robert wouldn't agree to it. "Learn what you can on your own first," he told him. "If you get stumped, then maybe we'll bring in more people, but for now I don't want this to get out." He looked meaningfully at the x-ray tech as he said that. This was a different woman than the one who had run the ultrasound machine. Now there were three strangers who knew about him.

That night in bed, he asked Elaine, "Do you think we should run?"

She was staring at the ceiling now. He was looking at her, admiring the way the covers followed her curves and wondering how much longer he would be able to enjoy such simple pleasures.

"Where would we go?" she asked. "We would have to start all over."

It was such an easy phrase to say, but he could imagine how difficult it would be to actually accomplish. He didn't know the first thing about how to establish a false identity, or how to evade a dedicated search if the government really wanted to track him down. And if he ran and they did catch him, then it would be almost impossible to convince them he was innocent. Innocent of what, he had no idea, but that was what scared him. What would they think he knew, and how far would they go before they believed that he didn't know anything?

"Maybe Dr. Sorenson will figure out what the deal is," he said.

"Yeah."

They lived with that fiction for three more days, days in which Robert alternated between fear of discovery and fear that he wouldn't be discovered, that no answer to the question of his origin existed. By Tuesday morning, when Dr. Sorenson called him at work, he would have talked to a veterinarian if the veterinarian had had answers.

Sorenson had none. "I don't know anything more than I did before," he said. "You're different inside, and it all seems to work together, but I don't have the expertise to figure out what it all does or why you're this way. If you want to learn anything, you're going to have to let me consult with people who might know something."

"Who would that be?" Robert asked.

"Charles Magnessen at the National Register of Pathological Anomalies, for one. He runs a clearinghouse for physiological oddities like yours. It's mostly bifurcated tongues and extra ribs and things like that, but he may have seen some of these extra organs of yours, either one at a time or together. That could tell us how common it is, which is more than we've got to go on now."

"And what happens when he reports it to the Pentagon?"

"He's not going to report it to the Pentagon! If he tells anyone, it'll be other doctors at the NRPA, and your identity will be removed from the data."

My identity *is* the data, Robert thought, but he knew what Dr. Sorenson meant. He considered the risk of exposure versus the risk of dying of curiosity, and finally said, "Okay, go ahead and do it."

He was standing next to the cash register while a customer waited for him to finish his call and ring up a set of Harry Potter books. When he hung up, the customer, a woman in her midforties or so, said, "Sounds mysterious."

"I'm an international spy working undercover," Robert said. "We're taking down a money laundering operation in Moscow."

"Right." She smiled. He smiled back, thinking: If only you knew.

If only anyone knew.

Dr. Magnessen didn't know. He was plenty interested in finding out, but his interest didn't require Robert's actual presence. Dr. Sorenson had already done all the tests Magnessen could think of. He examined the data and asked dozens of questions by phone—most of which Robert couldn't answer—then, with Robert's permission, he consulted with still more experts in abnormal physiology, all of whom were just as stumped as he.

Several of the experts had questions of their own, and some even advanced theories, which Robert quickly shot down. He hadn't suffered a major viral infection when he was young, and he hadn't been injected with any experimental vaccines. He couldn't disprove the theory that his biological mother had been abducted by a UFO, but he shot that down all the same.

"What if it were true?" he asked. "Then what? Nothing, unless the aliens want to come back and claim me. I want a more useful answer."

Up to that point, he had avoided looking into his adoption records. He didn't know why, but he supposed it was out of loyalty to the parents he had known all his life. If he tracked down his birth parents, what would that do to his relationship with his mother and father?

Elaine offered to do the research for him. When all the medical experts came up blank, he turned her loose on it, hoping that what she discovered wouldn't rock his world yet again.

It took her a week on the internet and on the phone, but with Dr. Sorenson's backing, she was able to convince the New Mexico adoption bureau that Robert had a medical need to know. He was home when the reply came; he went into the garage and sanded old paint off a bookcase he was restoring while she took the call.

She came out a few minutes later, a long expression on her face. "They don't know who your parents were," she said. "You were a foundling, left on the doorstep."

"God damn it." He kicked the bookcase. He caught his toe on the corner and winced in pain, but he kicked it again anyway. "This is too fucking much. *Some*body has to know how I got this way."

Elaine took his hands in her own. "It doesn't matter. You're the same person you've always been. Nothing has changed."

"Everything has changed," he said.

"No it hasn't. Only your self-image. The rest of us still see you the same way we always have."

He pulled his hands away. "You can't speak for anyone else."

"I just did."

"Well, you're wrong. Dr. Sorenson certainly sees me differently than before."

"He sees a patient. One who's worrying about nothing."

"Having my insides all stirred around isn't nothing!" When she stepped back, he took a deep breath and said, "Sorry. I'm upset."

"And I'm telling you you don't have to be. So what if you're different inside? What does it matter? You're still my husband, and you're still—"

"What about children?"

"What?"

He reached out and took her hands just as she had done with him a moment earlier. "What about our children? If we can even have children. What if they inherit this . . . this *condition?*"

"So what if they do? It didn't kill you."

"But we don't know what it might do to them. My genes mixed with normal genes could create monsters."

That made her pause. She looked away, and her hands quivered in his. But she looked back at him and said, "If that happens, we'll know long before it's born. If there's a problem so severe that life for the baby wouldn't be worth living, then we abort the pregnancy."

"Oh really? Just like that."

"No, not 'just like that.' It would be hard. We would have to consider all sorts of things that we'd rather not think about, but that already happens to parents who aren't even expecting problems, and they get through it. It may happen to us, but if we aren't prepared to make that decision, then we shouldn't have been thinking of having children even before."

The garage seemed such an incongruous place to be having this discussion. Elaine's car—a six-year-old Saturn—filled the left-hand bay, and a pile of boxes that they had no room to store anywhere else filled the other half. The workbench took up what space was left at the front of the garage, and the pegboard above the workbench held the tools that Robert used to fix whatever needed fixing around the house. There was nothing up there to help him now.

He said, "I was prepared to deal with the possibility that we might have a genetic problem when the chances of that happening were no worse than average. Now we know they're a lot worse. It changes the equation."

"Not fundamentally."

"No," he admitted. "Not fundamentally. But it changes it."

Elaine's expression hardened. "Look, I know you're upset, but my ability to procreate is on the line here, too, and you're trying to decide for both of us."

He didn't have an answer. Maybe she was right, but he still felt like the creature from the Black Lagoon. What hope did they have of a normal child?

"Actually, you're trying to decide for the whole human race," she said. "These differences of yours could be important. What if your organs are better than everybody else's? What if they're immune to diseases? You could be the next stage of human evolution. Do you want that to be lost forever?"

"I'm not the next stage in evolution," he said. "I don't know what I am, but I just want to be normal."

She shook her head. "Nobody is normal. The definition of what's human covers a whole spectrum of differences."

"Not this kind of difference," Robert said.

They looked at one another in silence for long seconds before Elaine said, "How do you know?"

They left it at that. Elaine went back in the house, and Robert continued sanding the bookcase until there wasn't a speck of paint left on it. The wood underneath was solid oak, and when he wet a finger and rubbed the moisture into the grain, it glowed with inner warmth.

That night, he called the Pentagon. He found a phone number on their web site, but when he dialed it he got a recording and a phone tree that seemed endless. He punched in dozens of numbers, always choosing the option that sounded most like it would lead to a human operator, but after fifteen minutes of frustration, he hung up and went to bed.

Elaine was already there, curled up for warmth. He lay beside her, staring up at the splash of silver on the pebbly ceiling from the streetlight and wondering what to do next. Call the National Guard? How about the *National Enquirer?* Go talk to a priest? Or go out in the back yard and shine a flashlight straight up?

He shivered. Silly as it seemed, that would be the scariest option of all. If he got a response, then he would know for sure that he wasn't human.

How would he know for sure if he was? Elaine's question still haunted him, and her answer scared him almost as much as calling down the mothership. Maybe his genes would be good for humanity, but maybe not. It was an experiment fraught with risk. So was any child, but still.

Elaine stretched her legs, then brushed up against him as she repositioned herself. The simple touch of her naked body against his made his skin tingle, and a moment later he felt the first stirring of arousal. He willed it to go away, but the more he concentrated, the harder he got.

Betrayed by his own body at every turn. He no longer knew who—or even what—he was, but that didn't matter to his genes. They didn't worry about existential angst, only existence.

How many other people lay awake tonight, wondering who they were? Even the ones who were normal inside couldn't answer that question. All they could really say with any certainty was who they wanted to be.

His erection reached full height. Elaine, with the unerring instinct of millennia of evolution, slid her hand up his thigh and murmured sleepily, "Hmm, what's this?"

"I guess it's just me," Robert said, and he rolled toward her instead of away. ■

Science Fact

After Gas: Are We Ready for the End of Oil?

Richard A. Lovett

> "Growth, growth, growth—that's all we've known . . . World automobile production is doubling every 10 years; human population growth is like nothing that has happened in all of geologic history. The world will only tolerate so many doublings of anything—whether it's power plants or grasshoppers."
>
> —M. King Hubbert, 1975*

In 1956, an oil-company geologist named M. King Hubbert made a bold prediction. U.S. oil production outside of Alaska would peak in the early 1970s and decline forever after. In 2001, Princeton University geophysicist Kenneth S. Deffeyes, a former colleague of Hubbert's, took the analysis a step further, predicting that world production would do the same sometime between 2004 and 2009.[1] Three years later, in a lecture at a meeting of the American Geophysical Union, he asserted that the peak would come sooner rather than later. In fact, we may already be past the peak by the time you read this.[2]

Then, in his 2006 State of the Union Address, President George W. Bush drew headlines by announcing that America is "addicted to oil" and that the time had come to do something about it. He pledged to invest in alternative energies (including ethanol and hydrogen fuels) and to reduce Middle Eastern oil imports by 75 percent by 2125. He also promised increased funding for alternative energy, including hydrogen-powered cars.

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* From a blog post by Ron Schuler, http://rsparlourtricks.blogspot.com/2005/10/m-king-hubbert.html, October 5, 2005

In combination, these announcements raise two alarming questions: (1) Are we about to run out of oil? (2) What are we going to do about it if we are?

Let's start with the "are we?"

The short answer is "no." We may run low, but not "out." That's because as oil gets scarcer, price rises will force us to cut back. At least a modicum will remain in the ground for a long time.

A better question is when we will be forced to cut back. Conventional wisdom says that we can figure out how much oil we have left by dividing the amount that remains by the annual rate of consumption, with fudge factors for anticipated growth, both in demand and supply. Right now the world has about a trillion barrels of known reserves and is using somewhere around 30 billion per year.[3] That sounds like a thirty-plus year supply, but to Hubbertians it's not. There comes a point, they say, when the oil gets harder and harder to pump out of the ground. Even if there's several more years' supply there, we simply can't get it out fast enough.

To many people, this was Hubbert's primary contribution: the realization that the rate of extraction increases, peaks, and then declines, long before the oil is totally gone. In any given oil field, there's initially a lot of oil available, but the field is underdeveloped. Then come more wells and increased production—until yields begin to decline no matter how many technological improvements you make.

All of that makes intuitive sense: There's "easy oil" and "hard oil," and by definition, the easy oil comes out of the ground faster. But Hubbertians take it a step further and apply the same analysis to the entire world. Initially, there's a lot of oil available, but extraction techniques are crude. There's not much demand yet, either. Then as technologies adjust, demand soars, mass-production becomes feasible, and the rate of extraction skyrockets. Until, that is, you can no longer keep up.

Hubbert asserted that this process more or less follows a bell curve. His reasoning was complex (one 1982 journal article covered 125 pages), but once you've said "bell curve," you know that peak consumption comes at the middle, when you've used up half of the world's total endowment.

Remember those trillion barrels of reserves? Well, we've already used 900 billion (a bit more by the time you read this), so if that's all there is, we're getting close to the midpoint. Once we get there, Hubbertian theory says, our oil-consuming lifestyle will change, like it or not. Worse, it may change pretty quickly. David Goodstein, vice provost at California Institute of Technology, estimates that if Hubbert's peak hits today, we'll slide down the other side of it so quickly that world oil production will be halved within a decade. Deffeyes projects a 90 percent decline by 2019. That doesn't give us a lot of time to adjust.

"We have a civilization firmly rooted in a mathematically impossible promise of an endless supply of oil," Goodstein

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[1] I reviewed his book, *Hubbert's Peak: The Impending World Oil Shortage*, for *Analog* in September 2002.

[2] That lecture is expanded in a second book: *Beyond Oil: the View from Hubbert's Peak*, published in 2005.

[3] These are 2004 statistics. Many of the figures in this article are taken from *Beyond Oil and Gas: The Methanol Economy*, by George A. Olah, Alain Goeppert, and G.K. Surya Prakash (2006), which devotes its first 100-plus pages to an extremely detailed compendium of facts, figures, and history. Current information is tabulated on the website of the federal Energy Information Agency, www.eia.doe.gov.

said in late 2004. "The oil will run out. The only question is when."[4]

Hubbertians vs. Cornucopians

To say that all of this is controversial is like saying it sometimes rains in my home state of Oregon. Hubbertian theory is *wildly* controversial.

Part of the controversy lies in the fact that to know what fraction of the world's oil we've used up, you have to know how much there once was. That includes undiscovered reserves, plus known ones from which new extraction techniques will improve our ability to wring the last drops.

Ideally you'd do this with a careful geological survey of the entire world, adding up everything you find. Instead, you have to estimate.

The estimates are all over the map. Most geologists believe there are at least a trillion barrels left. The U.S. Geological Survey thinks there are nearly a trillion more undiscovered barrels. By one estimate, we're at the midpoint now. By the other, we've got several more years—fifteen at present consumption rates, fewer if consumption continues to increase.[5]

But if you believe in Hubbert's bell curve, there's another way of calculating the total: simply find the best-fit curve to historical levels of production. That not only tells you where we now are on the curve, but it also corresponds to a specific level of initial endowment. Doing that calculation gives us a number on the order of two trillion barrels: very close to the lower-end geological estimates.

If this is correct, it means that technology and mammoth new discoveries aren't going to come charging to the rescue. That doesn't mean we won't find new oil, merely that it's going to show up in increasingly small pockets. "Ninety-four percent of the oil we're ever going to find is in fields that are already producing," Deffeyes calculates.

Scoffers argue that the entire analysis is vastly oversimplified. To begin with, political and economic factors in oil-rich countries can cause the rate of exploration to be erratic, making it look as though there's less oil available than actually exists. "This isn't science; this is forecasting," says Michael Lynch, President of Strategic Energy & Economic Research, Inc., of Winchester, Massachusetts.

It's comparable, he says, to trying to make money in the stock market by fitting curves to companies' performance, without understanding anything about their industries. "I think people who gamble on the price going up and up are going to be very, very sorry," he says.

Others note that even today's best extraction techniques leave half the oil in the ground. We can buy a lot of time if we can figure out a way to get the other half.

Deffeyes counters that the world hasn't seen a major new oil discovery in three decades. (As this article was going to press, a new find was announced deep beneath the Gulf of Mexico. At 15 billion barrels, it is large, but it only increases the world's total reserves by about 1.5 percent.)

Furthermore, Hubbert's equally simplistic claim regarding production in America's Lower 48 states turned out to be slightly optimistic: the actual peak occurred in 1970.

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[4] For more, see his book, *Out of Gas: The End of the Age of Oil* (2004).

[5] There is yet another controversy, of course, over whether there are oil fields which, for ecological reasons, we might not wish to drill. In the big picture, though, these don't amount to much. Even a 30-billion-barrel oil field (about four times larger than the U.S. Geological Survey's mid-range estimate for recoverable reserves in Alaska's Arctic National Wildlife Refuge) would only shift the date of the midpoint by six months.

Deffeyes calls his opponents "cornucopians" and strongly advises against banking too much on finding a way to extract the presently unrecoverable oil. A lot of research has already gone into trying to solve this problem, he says, and so far the oil is still in the ground.

"I can't tell you what the price is going to do, but I can promise great volatility," he added, a few months before Hurricane Katrina proved just how vulnerable U.S. gasoline prices are to even transient disruptions.

No Panacea in Import-Cutting

What about President Bush's desire to reduce U.S. from dependence on Middle Eastern Oil? It's a laudable goal, but more modest than it sounds. In fact, if the Hubbertians are correct, declining production will do it for us anyway. But even if the cornucopians are correct, it's a surprisingly modest goal. That's because, while the U.S. imports 60 percent of its oil, relatively little comes from the Middle East.

Only one Persian Gulf country, Saudi Arabia, ranks among the top five foreign sources, and it's third, behind Canada and Mexico. According to the Energy Information Agency, a division of the U.S. Department of Energy, U.S. oil imports (as of early 2006) totaled 421 million barrels per month. Only 41 million came from Saudi Arabia. That's compared to 70 million from Canada, 53 million from Mexico, 37 million from Venezuela, and another 37 million from Nigeria.

Reducing Middle Eastern imports won't cure our reliance on foreign oil, says Ray Kopp, an economist at Resources for the Future, a nonpartisan think tank. Even if we imported no Middle Eastern oil, we'd be vulnerable to political instabilities in that part of the world because global oil prices are tightly linked.

We also have allies, most notably Europe and Japan, that are strongly dependent on Middle Eastern oil. "None of that would change if we change our own energy policy," says Alex Farrell, a professor in the Energy and Resources Group at the University of California, Berkeley.

Still, President Bush's goal amounts to a 15 percent reduction in total U.S. oil consumption, and if there's anything at all to this Hubbertian stuff, that's a great idea.

The simplest (but politically least palatable) approach is conservation. Increasing the average American car's fuel economy by only a few miles per gallon would be enough to do the trick. But that's a political minefield, because virtually all experts agree that the first place to start is by getting rid of SUVs (or at least radically cutting down on their numbers). Even then, low-mileage cars aren't going to go away overnight. Car models are planned several years in advance, and even when we do start making more efficient cars, the old ones will remain on the roads. "It takes 15 years to roll over the vehicle stock," says Kopp.

For many people, the solution lies in biofuels, particularly ethanol.

Corn to the Rescue?

Biofuel is one of the few energy topics on which liberals and conservatives seem to be in agreement. Partly, that's because growing fuel, rather than importing it, sounds good for the economy. But biofuels also appear nicely "green" and renewable: the perfect win-win solution for preserving both our lifestyle and the environment.

In the U.S., ethanol is made by fermenting corn in industrial plants. (Brazil makes it from sugar cane.) But even though it's already a billion-dollar industry, it only produces four billion gallons per year, says Surya Prakash, a chemistry professor at the University of Southern California. Because ethanol is a lower energy fuel than gasoline, that's only enough to replace 2.5 billion gallons of gasoline, less than one percent of U.S. usage. "It's a drop in the bucket," says

Prakash. "It can hardly cover three or four days."

Worse, it may take more energy to make ethanol than you get back in fuel. That in itself isn't catastrophic—after all, biofuel simply converts solar energy first into plants, then into petroleum substitutes. We don't have to capture all of that solar energy to get a usable fuel. But the problem is that ethanol takes a lot of fuel to produce: enough that instead of making the nation more energy self- sufficient, it may, ironically, increase our need for oil and gas.

In a 2005 paper in *Natural Resources Research,* David Pimentel of Cornell University calculates that it takes the equivalent of 1.29 gallons of gasoline to produce enough ethanol to replace one gallon of gasoline—and that's not counting the solar energy that falls on the cornfield. He reached his conclusion by adding up the energy cost of every input he could think of that goes into ethanol production, ranging from that used to produce the farmer's lunch (trivial) to the diesel fuel needed to power the tractor (substantial). He finds that it takes the equivalent of 271 gallons of gasoline to grow a hectare (about 2.47 acres) of corn—yielding enough corn to replace 450 gallons of gasoline.

Lunches and tractor fuel aren't the only inputs that go into this calculation. The biggest is the energy that goes into manufacturing nitrogen fertilizers, which are mandatory for high-yield corn growing. These fertilizers are made by heating natural gas under conditions in which it will react with nitrogen in the air. Not only does that require heat, but it uses up natural gas that could have been burned as fuel.

More energy is needed to turn the corn into fuel. Ethanol is produced by grinding corn, mixing it with water, and fermenting it in a process similar to that used to make beer or wine. The unprocessed product, in fact, is a lot like beer: 8 percent alcohol and 92 percent water—not something that's going to burn in a car engine. To make a usable fuel, all but 0.5 percent of the water must be removed. This is done by a distillation and chemical extractions that, according to Pimentel, use even more energy than was used to grow the corn. And that doesn't count the fuel needed to ship corn to the ethanol plant or ethanol to the pump.[6]

In theory, all of these costs should make ethanol uneconomical to produce. But it can be produced affordably, because the government is subsidizing its production to the tune of $3 billion per year.

Tad Patzek, a chemical engineer at the University of California, Berkeley, who collaborated with Pimentel, calls the whole thing a "politically driven initiative" by "confused people" who think it's good for the country.

"We need a new liquid fuel," Pimentel adds, "but this isn't the one."

Hosein Shapouri disagrees. An economist with the U.S. Department of Agriculture, he, too, has spent years studying the amount of energy needed to produce ethanol. His latest calculations, published in 2004, conclude that for each gallon of gasoline invested (or its equivalent in coal, electrical power, etc.), you get back the equivalent of 1.67 gallons of gasoline. That's up, he adds, from 1.36 gallons in 1996 and 1.24 gallons in 1991.

Shapouri charges that Pimentel's work is based on an outdated understanding of how the industry works. "Corn production is becoming more efficient," he says, "and ethanol is, too."

Pimentel, on the other hand, accuses Shapouri of overlooking important steps in the farm-to-ethanol process. "The reason the USDA comes up with positive returns and we do not," he says, "is that they omit about half of the inputs."

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[6] An additional problem is that corn is an environmentally unfriendly crop. It contributes to soil erosion, and pesticides and the nitrates from nitrogen fertilizer contaminate creeks, rivers, and even the Gulf of Mexico.

One "input" that Shapouri has overlooked, Pimentel says, is the energy used to make and maintain farm equipment. "Have you seen many farmers raising corn by hand?" he asks. But the most important dispute involves how to account for the fact that fuel isn't the only product to come from an ethanol plant. The fermentation leftovers form dry distiller's grain, which can be used in food production. Because the grain represents nearly 34 percent of the plant's output, Shapouri argues that 34 percent of the total energy cost should be credited to it. That leaves only 66 percent to be charged against the ethanol: a big difference.

Pimentel agrees that a credit is appropriate but argues that because soybean meal can be used for many of the same purposes, the appropriate adjustment is for the amount of energy needed to grow and produce soybean meal—vastly smaller than the amount needed for growing corn and making dry distiller's grain.[7]

All in all, it's a mind-bendingly complex argument that plays poorly in the battle of sound bites. And, at least for the moment, it looks as though ethanol proponents have won. In his State of the Union address, President Bush weighed in on their side, and at the grassroots level, ethanol proponents are pushing ethanol fuel bills in states ranging from the farm belt to the West Coast.

Corn, of course, isn't the only crop that can be converted to fuel. Biodiesel and "cellulostic" fuels, made from other plant sources, may hold greater promise. These include products made from switch grass and wood chips, as well as fuels made from plant oils.

These products require less energy to produce, in part because the plants don't need as much fertilizer. Also, "cellulostic" fuels are made from cellulose, a portion of the plant that cannot be fermented into ethanol by conventional processes. Using it can substantially increase fuel yields.

There's still the question, however, of how much of such fuels we can realistically make. Prakash estimates that at maximum, they can replace only 10 to 15 percent of gasoline usage. Daniel Kammen, another energy expert at UC Berkeley, is more optimistic. Currently, he says, enough biomass is being generated in timber growing, farming, and as urban waste to meet 10 percent of U.S. transportation needs. With a major commitment, he thinks it might be possible to replace all of the nation's oil with biofuels. Even with major improvements in automobile fuel economy, though, that would require putting an additional 100 million hectares into agricultural production (an area 2 $^1/_2$ times larger than the state of California)—nearly a one-third expansion in the nation's entire farming acreage. "It's doable," Kammen says, "but it would take some rough choices."

Alternative Energy

Luckily, the crisis we're facing isn't an energy crisis, per se. We may run short on oil, but we still have plenty of sources of energy.

Top of the list is natural gas, of which there is about twice as much (in energy units) as there is of oil. Coal is even more plentiful. After that, there are tar sands and oil shales (although there are serious questions whether the latter can ever be mined on an energy break-even basis). Another wild card is methane hydrate, a weird type of natural gas-containing ice that forms under cold, high pressure conditions, typically in the Arctic or deep beneath the sea. Nobody's quite sure how much there is or how to extract it, but it may be more than 100 times more plentiful than conventional natural gas.

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[7] For more, see rael.berkeley.edu/ebamm. The whole issue was rehashed in early 2006 when a "meta-analysis" in *Science* argued that ethanol can indeed be grown at a net-energy plus. But there wasn't really anything new in the *Science* paper, which simply recalculated Pimentol's figures under Shapouri's logic, then attempted to claim that the two were actually in agreement—something Pimentel sharply disputed in subsequent press interviews.

Currently, natural gas reserves stand at 180 trillion cubic meters: a 67-year supply at current usage rates. Coal stands at more than 900,000 megatons: a 160-year supply. But remember, usage of these is likely to increase (especially as we start running out of oil), and there's no reason not to expect each of them to face its own Hubbert's peak. For natural gas, Goodstein thinks that could happen in as little as a decade, and for coal, it will probably come well before 2100. Perhaps methane hydrates will save us for another century, but that's speculative.

Furthermore, we need to remember that Westerners aren't the only ones who'll want all these things. In 2000, China and India used only one-sixteenth as much oil per capita as Americans did, says Amos Nur, a geophysics professor at Stanford University. Given their much larger populations, even a modest increase in their per capita usage would represent an enormous increase in worldwide demand.

Nur fears incipient panic and possibly even an oil war as the U.S. and China seek to safeguard their own supplies.

Goodstein predicts inflation, depression, and resource wars, if not over oil, then over natural gas, coal, or other fossil fuels. Deffeyes' predictions aren't quite as bleak, though he does think the next few years might be unpleasant, as prices soar and people in the Third World starve for lack of affordable tractor fuel. But so long as we avoid a major war, he predicts that the fifteen-year time horizon will find us settling into new energy sources.

What will this alternative-energy future look like?

Obviously, alternative fossil fuels will play a big role in it. But all of these have the drawback that, like oil, they contribute to global warming. Many experts prefer nuclear power. And in the long run (unless we finally manage to master fusion), the future belongs to solar power and wind.

If we desire, solar and wind can be harnessed for large-scale products. Pave over an area the size of Nevada with solar cells, and you could generate all the power the country needs. But it doesn't have to be done on such a monolithic scale. A significant fraction of the country is already built up, opening the door for putting solar collectors atop existing structures.

California recently enacted a "million solar roof" initiative, funded by a 25-cent-per-month tax on utility bills. The goal is to install 3,000 megawatts of rooftop solar collectors in ten years (enough to power a city of 600,000), tripling that level in the next five years. People who generate excess power, this way or via windmills, can sell it back to the electrical grid. Rather than a future of enormous, centralized power plants, we may see one of dispersed electrical generation with lots of little (and literal) cottage industries. "We need to think of the grid as eBay, where everyone can buy and sell, and the utilities are the broker," Kammen says.

But there's a difference between an energy source and a convenient fuel. What electric power alone doesn't give us is a vehicle equivalent to what we've become accustomed to. Unless you weigh them down with enormous batteries, electric cars are low powered and have limited range. If you really want to drive long distances or reach the end of a freeway onramp at a speed that won't get you rear-ended, you need a more traditional type of fuel.

To start with, though, there's a lot

that can be done to improve even a high-mileage car's fuel economy. Gas/electric hybrids are a great innovation, with generators that convert the energy otherwise wasted in braking into usable power. The next step is to add extra batteries to these cars to create plug-in hybrids that can be topped off at home, the office, and the mall. Already, an organization called CalCars is at work on this project. "It's a cool technology," says UC Berkeley's Farrell. "It displaces the fuel source for some of your travel from petroleum to whatever is supplying your electricity."

An alternative fuel that has nothing to do with petroleum would also help. Currently there are two prospects (assuming that ethanol really is a dead end): hydrogen and methanol. Both provide ways of converting solar-generated electrical power into something portable.

Hydrogen, Hype, and the *Hindenburg*

"Hydrogen is the energy source of the future." I've lost track of the number of times I've heard this. But unless we're going to scoop hydrogen out of the atmosphere of Jupiter and bring it back here to burn, it's nonsense. You can't drill a hydrogen well on Earth, because Earth's hydrogen is almost entirely bound chemically to other elements. That means that you have to *make* hydrogen fuel, by prying hydrogen loose from something else.

There are three main ways to do this. One is by partially burning coal in the presence of water vapor. That gives you "synthetic gas," a combination of hydrogen and carbon monoxide. Another is to "steam reform" natural gas by allowing it to react with high-temperature steam in the presence of a catalyst. Again, you get a mix of carbon monoxide and hydrogen. In both cases, you can increase the hydrogen yield via a second production step in which the carbon monoxide is reacted with additional steam, to produce hydrogen and carbon dioxide.

But these processes simply generate hydrogen from fossil fuels. For a truly renewable source, you need electricity and water.

As you probably remember from high school chemistry, you can generate hydrogen and oxygen by passing an electrical current through water. This takes more energy than you're going to get back out of the fuel, but that's not quite the same problem we had with ethanol. With ethanol, we were using tractor fuel, etc., to make fuel. Here we're converting electricity into fuel.[8]

But hydrogen has some major disadvantages. The scariest, of course, is that it is highly flammable. Nobody wants their hydrogen-fueled roadster to go the way of the *Hindenburg*. (Although, it wasn't actually the hydrogen that was to blame for the *Hindenburg* fire. It was the zeppelin's outer skin that initially burst into flame.) It's also hard to see a hydrogen flame, raising the prospect that when accidents do occur, people will be slow to recognize the danger.[9]

A bigger problem is storage and distribution. Hydrogen gas can't be stored in most existing containers or shipped via natural gas pipelines because it is comprised of extremely small molecules that would diffuse through their walls and be lost. Prakash estimates that the much-touted hydrogen economy would require $2 trillion to $3 trillion in pipeline upgrades. That creates a massive chicken-and-egg problem, Prakash says, because who's going to commit to hydrogen cars (except as toys) if there's no fuel-distribution infrastructure? And who's going to build pipelines until there are hydrogen cars?

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[8] Hydrogen, incidentally, is a fuel that can be used in fuel cells to drive some extremely efficient motors. It's also extremely clean-burning, producing nothing but water and perhaps a few trace contaminants.

[9] On the other hand, burning hydrogen won't spread across the ground in a lake of fire, as with liquids like gasoline.

Hydrogen is also difficult to compress and store—so difficult, Prakash says, that you'd spend 30 to 40 percent of its energy simply to liquefy it. On top of that, it's bulky, even when liquefied. It would take three tanker trucks to ship enough hydrogen to replace one tanker truck's worth of gasoline. There are also concerns about the effect of hydrogen leaks on the Earth's ozone layer.

Prakash prefers methanol, which is a liquid at room temperature. That allows it to be burned in existing engines and transported in existing pipelines with only minor changes.

Methanol is an extremely simple molecule—its molecular formula is CH_3OH. It used to be called wood alcohol or methyl alcohol, but those are terms that should be discouraged, Prakash says, for fear that people will think they can drink it. It's several times more toxic than gasoline, which might make siphoning by mouth a bad idea, but ecologically it's safer than gasoline because it's biodegradable. It also dissolves easily in water, so that a methanol spill will quickly be diluted to the point where it can readily degrade.[10] Methanol can also be used as a feedstock for the petrochemical industry, which currently uses six percent of the world's oil production.

For all of these reasons, Prakash and two other USC chemists, spearheaded by Nobel laureate George Olah, see methanol as the fuel of the future. In the short run, they argue in their book *Beyond Oil and Gas: The Methanol Economy,* it can be made from natural gas. But the real dream lies in the long run, when nuclear or renewable electrical power can be harnessed to make it from carbon dioxide and water. This has the advantage not only of harnessing electricity to create a fuel that's a lot easier to store and ship than hydrogen, but of doing so with a gas that's widely considered to be a leading culprit in global warming. Prakash sees this as a way of "recycling" carbon dioxide the way nature does, rather than dumping it into the atmosphere or attempting to dispose of it by piping it into the deep ocean or underground.

CO_2 for methanol production, he adds, could either be scrubbed from the emissions of coal-burning power plants (while they're still in use) or extracted from the air, anywhere on the planet.

Whether we go with hydrogen, methanol, coal gasification, or something else, though, the changeover can't take place overnight. If the fossil-fuel cornucopians are correct, that's no problem because there's plenty of time for a slow, orderly transition. What has the Hubbertists concerned is that we've already spent too long sitting on our hands, rather than planning ahead.

Goodstein thinks that the future of civilization as we know it hinges on making the right choice and doing it soon. "We understand the basic scientific principles for a civilization that runs without fossil fuel," he says, "but we lack the political leadership and the will to do the job."

My own view is a bit more optimistic. I'm convinced of the basic Hubbertian premise that the peak comes long before we "officially" run out. But my Ph.D. is in economics, not geology. That gives me greater faith in the market to slow the rate of decline. What I fear is that people won't believe that the halcyon days are coming to an end and that complaints about price gouging will lead to political pressure for price freezes. To an economist, that translates to mile-long gas lines and no real incentive for producers to find alternatives: in short, the worst of all worlds.

I'm also a science-fiction writer, which means that I'm not that afraid of the demise of civilization as we know it.

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[10] It's also possible to create methanol-powered fuel cells.

I can envision lots of changes that won't be all that catastrophic:

- Telecommuting, telepresence, and VR waldos
- Amtrak
- Bike lanes on freeways
- No more cheap FedEx
- More online retail (though not with overnight delivery)
- Soaring real estate prices near mass-transit hubs
- Fortunes made (and lost) in alternative energy stocks
- No more strawberries in January[11]
- Neighborhood shopping districts
- Wool blankets and sweaters
- Air-conditioning as a luxury, not a necessity
- Two-minute showers
- Saudi Arabia as an enormous energy producer . . . of solar power[12]
- Superconducting, undersea power lines to shuttle solar power from sunlit regions to the dark side of the globe.

Are these the end of civilization, or just changes? I suppose that depends on what's critical to you. Me, I have an air-conditioner, but almost never turn it on. I've learned that even 90° isn't all that bad if you let the changing seasons acclimate you first to 75°, then to 80°, and then to 85°. And I'd do a lot more bicycle trips, too, if only the cars would get out of the way. A lot of folks think I'm kind of weird, but then, that's what they've always thought of us in science fiction.

Maybe the end of civilization as "we" know it actually belongs to those of us in science fiction. ■

About the Author:

Richard A. Lovett is a frequent contributor to *Analog*, and one of the few joint members of the Science Fiction and Fantasy Writers of America and the National Association of Science Writers. Writing is his day job, mostly for *National Geographic News*, the San-Diego *Union-Tribune*, *Running Times*, and *Psychology Today*. If that sounds a bit eclectic, it is; he has degrees in astrophysics, economics, and law. His Ph.D. is in the economics of natural resources.

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[11] I got this one from Deffeyes, who predicts that we're going to have to wean ourselves from air-freighted produce.

[12] I got this one from Goodstein's book.

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Double Helix, Downward Gyre

Carl Frederick

On a historic scale, everything changes, and new kinds of knowledge accelerate the process. The hard part is deciding when—and how—to react.

"It seems to get worse every day." Herrick pointed a butter knife toward his son. "I wouldn't be surprised if, before long, the only fundable science left was Creation Science."

"Oh, it's not that bad, Dad." Niels hoped he could head off another angry rant; it was not good for his father's blood pressure. "I expect Congress—"

"Congress!" Herrick gave a harsh laugh. "As a whole, they're as dumb as a Kansas school board."

Niels made shushing motions. "Not so loud," he said in a voice a little above a whisper. "It's not safe talking like that these days."

Herrick glanced around the restaurant. "We're safe here, I imagine. Technically, this is New Zealand territory." He returned his gaze to Niels. "I think it is, anyway."

They sat at a table at Maori's—a trendy Pacific Rim cuisine restaurant attached to the New Zealand mission to the United Nations.

Mission restaurants for the poorer countries were a source of revenue, but for wealthier countries, those with a declining birth rate, they acted as a lure to recruit immigrants. Herrick and Niels, for their weekly father/son dinners, had eaten their way through many of them. But then, acting on a recommendation, they tried Maori's. They liked the food, had no feelings of ill will toward New Zealand, and so settled on Maori's for their weekly culinary excursion.

Herrick grimaced. "This can't go on," he said, pushing away his half-eaten dessert, a chocolate-topped Pavlova. "Soon it'll be impossible to do any scientific research at all in this country."

Worried by the grimace, Niels watched as his father surreptitiously moved a hand over his stomach.

"And it doesn't help," Herrick went on, "that our government seems to mark top secret every scrap of paper down to and including toilet paper."

"Indigestion again?" Niels tried to keep the worry out of his voice.

Herrick shrugged, then gave a smile, clearly labored. "And there's no money for physics anymore." He pointed, this time with his forefinger. "It's good you're in medical research; aging politicians need you."

Niels knew his father was trying to move the topic away from his indigestion, and Niels, for the moment, would let him. "Actually, they *don't* seem to need me." Niels said. "In fact, I've been denied tenure." He looked down at his hands. "Great way to end the academic year," he added under his breath.

"What?" Herrick sat back from the table as if struck. "No! I can't believe my alma mater would act that way. Not Yale."

Niels forced a smile. "Some wealthy alum objected to my Evolutionary Biology course."

"What are you going to do?"

"Nothing." Niels stirred his coffee, even though he drank it black. "As long as I don't make a stink about it, the university will simply ignore the situation." For the sake of his father, he tried to downplay the insult. "My teaching and research won't be affected. I just won't be tenured. No big deal."

Niels saw his father bite down and, almost as if in reflex, move his hand toward his stomach and then abruptly change direction and pick up his teacup.

"Look, Dad." Niels leaned forward. "You've got to get that looked at."

"What?"

"That indigestion."

"It's nothing." Herrick chuckled. "Probably just the result of a few too many hot chili lunches at Taco Diplomacy."

"You can't just keep laughing it off. What are you afraid of?"

"I'm all right," said Herrick, his voice raised.

Niels silently glowered at him.

"All right. All right," said Herrick, wilting under the stare. "I am a little worried about it. Hypochondriac that I am, I'm afraid it might be a serious disease."

"So what? Most everything can be treated these days." Niels stared into his father's eyes. "That is, if one doesn't wait too long."

Herrick bent his head as if critically examining his dessert. "I'm worried that the disease might have a genetic component."

"Ah." Niels sat back in his chair. "So that's it." He smiled as he speculated on a reason his father was, at his age, so set against sterilization. "Dad. Are you, by chance . . ." Niels felt embarrassed asking his father this. "Are you engaged in some, um, intimate behavior?"

"You mean, am I having sex these days? No . . . unfortunately. Not that it's any business of yours."

Niels, glancing at the other diners, made shushing motions with his hands.

Herrick smiled, obviously enjoying his son's discomfort. But the smile was fleeting. "A Genetic Component Disease automatically triggers the Genetic Patriotism Act—doubly automatically now that all medical reports are sent to the Department of Health."

"So it might be a GCD," said Niels. "You're a little old to have more kids—so what, other than aesthetics, is your objection to sterilization?"

Herrick shook his head sadly. "When I was a teenager," he said, speaking more to the table than to his son, "I was afraid of dying from some terrible disease. But now . . ." He took off his glasses and rubbed his eyes. "Almost no one dies of disease or congenital conditions." He let out a breath. "Maybe the government's right. Maybe the fact that we can cure most things *has* counteracted the survival of the fittest."

"You don't really believe that," said Niels. "Forced sterilization for the sake of the gene pool."

"No—" Herrick cleaned his glasses

with an edge of the tablecloth, an action Niels recognized as a sign of stress. "—and I certainly don't like the government considering me ungodly just because I happen not to have been created in God's genetic image."

Niels slapped a hand gently to the table. "Tomorrow, I'll pick you up at noon. You've got to have a complete physical. We've got to know if it's a GCD."

"No." Herrick shook his head.

"Why?"

"You do know that the Genetic Patriotism Act has been renewed?"

"So?"

"They slipped in a provision that children of a GCD victim must be tested for the defective genes. If they're found, the children must be sterilized as well."

"What? I didn't know anything about that."

"It's a classified provision. It can't be mentioned by the media."

"The bastards!" Niels balled a fist. "Well, I'm prepared for them." He tried for a confident smile. "You'll get your exam. I know a good 'back room diagnostician.'"

"A what, please?"

"Someone who can do the tests and won't forward the results to the government."

"I've heard stories," said Herrick, "of medical blundering and even blackmail."

"This guy's reliable. I'll pick you up at noon." Niels motioned for the check. "Oh, and bring Fleabiscuit."

"What? What does my dog have to do with this?"

"The diagnostician's a veterinarian."

Herrick cast a glance to the ceiling. "Oh, great! It's good I'm not a horse. At least he won't shoot me."

"Don't worry," said Niels. "The guy has a good lab. We'll use the cover that Fleabiscuit needs a check-up before our family holiday in—" Niels glanced around at the restaurant's décor. "—in New Zealand." He gave a thin smile. "The way things are going in America right now, I'm just about tempted to emigrate."

"You and me both," said Herrick.

Early next morning, Niels made the appointment for his father's exam. Then, as soon as his bank opened, Niels withdrew some cash, much more than he would have been allowed at the ATM; the exam was a cash transaction. As he stuffed the bills into his wallet, he felt he was entering uncharted waters, tawdry and dangerous. He thought about his father's plight and decided it might do to have some insurance. Pulling out his cell phone, he did an Internet search for another kind of bank—and foreign-owned, protected from the prying nose of the government.

He found a local office of the *Zürcher Stern Samenzellenbank,* phoned, and made an appointment. He had just enough time before having to pick up his father.

At the bank, he paid to open an account, after which he was shown to a private room where he could attend to the details of his deposit. Fifteen minutes later, feeling remarkably exhilarated, he bounded out of the door of the establishment in happy possession of an anonymous numbered account at a Swiss-run sperm bank.

At one o'clock, in his car parked across from the veterinarian's office, Niels kept watch for his father's return. While he waited, he talked on his cell phone to Susan, a colleague from the university, a postdoc in his department. She was a New Zealander, the source of the Maori's recommendation, and over the last few months she'd become rather more than just a colleague.

"We'd no choice but to use a backroom diagnostician," said Niels.

"Why?"

"The 100 Percent American Act. For genetic security, they say. Don't you know it's un-American to keep medical records from the government?"

"Couldn't he get a.... a critical personage exemption, I think it's called."

Niels laughed bitterly. "Not a chance—unless you're a political leader, a televangelist, or a big-time corporate donor to the White House." He pounded a fist against the dashboard. "They're all a bunch of corrupt bastards. Pardon the language."

"I'd be careful how I talked over the phone," said Susan.

"Why? It's not as if the government can monitor all the millions of cell phone calls going on."

"Haven't you heard of the Real-time Conversation Analyzer?"

"Fine," said Niels. "Bomb, embryo, terrorist, hijack—that should get their attention. "Revolution, assassination, abortion."

"This is not something to joke about."

"Why not? You either joke or go nuts."

They talked until Niels saw the door of the veterinarian's office open and his father step through it, pulled forward by his elderly greyhound.

"Got to go," said Niels. "My dad's coming back—and he doesn't seem happy. See you at the club." Niels slipped the phone into his jacket pocket, then leaned over and opened the passenger-side door.

Fleabiscuit jumped in, then wiggled through to the back and wedged his nose out of the partially opened rear window. Herrick tossed the end of the leash into the car and settled into the passenger seat.

"How long until you get the lab results?" said Niels as he started the car.

"Already got them," Herrick said in a flat voice. "The vet had Insta-lab. And it was pretty obvious."

"What is it?"

"I'd rather not talk about it."

"A GCD?"

Herrick nodded.

"Curable, I assume."

"Yes—if I act soon."

Niels, white-knuckled hands on the wheel, wanted to scream. His father was gravely ill, and they were talking as if they were discussing an accountancy textbook.

"I don't know what to do," said Herrick.

"Susan has a plan." Niels tried to inject some life into his voice. "You remember Susan. She's the one who recommended Maori's."

"And what exactly is that plan?" Herrick's voice sounded less than hopeful.

"I don't know. Wouldn't say over the phone. Says we should join her for afternoon tea at the Commonwealth Club. She said to drop by about three."

"Fine."

Niels pulled his car into the high-speed lane. "I'll drop you at home and pick you up at two thirty. Okay?"

"Fine."

They drove in silence. After a while, Niels noticed a black car behind them that seemed to be echoing his turns. *I must be getting paranoid.* For the remainder of the trip, Niels split his attention between the road ahead and the car behind.

When Niels reached his father's house, the black car was nowhere to be seen. Niels, relieved, said goodbye to his dad and accepted a lick on the face from Fleabiscuit. Then he set off for home.

A few blocks later, Niels saw the black car again. After a flash of fear, he forced his mind calm. He'd not done anything wrong. He had nothing to fear. *At least they're not after my dad.*

When he reached home, he didn't park, but repeatedly circled the block. The black car followed but after four circles, veered off. Niels circled twice more and then, seeing no sign of the pursuer, parked and darted into his house.

An hour later, Niels got a phone call from his father.

"Well, the good news," said Herrick in a "not good news" tone of voice, "is that I've had my first treatment for my GCD."

"Dad," said Niels, confused. "What happened?"

"Apparently either the veterinarian or your friend Susan is a government informant."

"Are they holding you? Where are you?"

"Oh, I'm quite free," said Herrick. "They've no further need for me. They performed the—the other procedure on me and let me go."

Niels stifled a gasp. "Without appeal or due process? That can't be."

Herrick laughed without mirth. "It appears that genetic security trumps the Constitution."

"So quickly?"

"Apparently, in some matters," said Herrick, "our government is coldly efficient."

"Dad, that's horrible. We have to take this up with—"

"What's done is done," said Herrick. "It's you I'm worried about. Get out of there. They'll be coming after you next."

"It's a one in two chance I don't have the defective gene."

"Unacceptable!"

"Dad, wait. We've got to meet."

"Get out of there!" said Herrick. "I'll contact you somehow. I don't know how, but I'll find a way."

"Wait. Let's meet at, I don't know, at seven thirty at—"

"Don't say it!"

"The phone? Wait. Let me think."

"You don't have time to think," said Herrick almost at a shout. "If you ever want to have kids, get away. Get away while you can."

Niels grasped at an idea. He whistled the first line of *The Whiffenpoof Song*, the signature song of the Yale singing group his father had belonged to.

"What?"

"Later, Dad. I'll talk to you later. Eli Yale!" Niels hung up.

As he returned the handset to its cradle, Niels noticed he was shaking. He only hoped his father had understood the clue. And he felt like a heel for not rushing to Susan's defense. There was no way Susan would have turned him in. Not Susan.

At the sound of a knock, Niels jerked his gaze from the phone to the door. He took a quick step toward it, then froze. It took a moment for him to identify his emotion: fear—stark terror. Not since he was a kid running from school bullies had he felt like this.

He dropped prone to the floor, eyes squeezed shut, overcome with rage. Either the vet or Susan had betrayed him. He directed his hate at both. Then another thought struck. He himself might be the guilty party; maybe Susan had been right. Maybe his cell phone *was* being monitored. He felt like a rat for suspecting Susan. *Amazing how fear can even make us turn against our friends.*

After a few frozen minutes, he crawled toward the front window. Inching himself up, he peeked through an edge where the blinds allowed a pinhole-like view of the sidewalk.

He could see no one outside, but the black car was parked directly across the street. Its windows were tinted and, against the sunlit street, he could make out none of the occupants.

He stared longingly at his own vehicle—parked directly in front of the black car. Slowly, he dropped his head to below window level and crawled to the front door. There he got to his knees, engaged the dead bolt, and activated the alarm system. He felt under siege in his own house.

He skulked off to his bedroom, packed an overnight case, and then padded softly toward the back door. He stopped. That's what they wanted him to do—to go out the back. The car in front was just a ploy.

"Damn it," he whispered. "Why don't they just come in and get me?" He realized the likely answer. They wanted to take him without a fuss—without people around. This was not a police operation, but something extrajudicial.

An idea began to form. There'd be a significant flux of people on the street after the 5:42 commuter train arrived from the city. And his car had a remote starter—so in the winter, his car would be warm when he got into it. That remote starter could give him the extra few seconds he needed. He'd make a break for it when the 5:42 came in.

Overnight case in one hand and car keys in the other, Niels peered through a gap in the blinds. His car, sleek, blue, and alluring, seemed an island of hope. He waited until he saw a wave of people flowing down the street. Taking a sharp breath, he activated his car's remote starter and then pushed the *unlock car doors* button. He flung open the door and sprinted for his car.

Running diagonally across the street, he saw the driver get out of the black car. The man held something metallic. Niels anticipated being shot down in his tracks—but then realized that what he'd thought was a gun barrel was the antenna of a transceiver. The driver fiddled with the device, and that gave Niels the crucial seconds he needed.

As he threw himself into his car, he saw a man running from behind the house toward him. Niels gritted his teeth and bore down on the accelerator. He felt like a criminal as he sped away. In the rearview mirror, he saw the black car coming after him. He'd not planned past this point. The car behind was chasing him, but to where? He had no idea. He struggled for a plan—even a thin vestige of a plan. Maybe he could try to lose himself in the city.

The black car kept its distance—following, but not overtaking. He had some breathing room. He buckled his seat belt and smiled. That simple act of fastening his seat belt gave him satisfaction, a small feeling of being in control.

Keeping one hand on the steering wheel, he fumbled for his cell phone and powered it off. He'd be unconnected, but at least no one would be able to track him. Seeing the phone display go blank, he had a sense of his tether to the world being broken. He felt like a criminal, like an alien in his own country. He returned the phone to his pocket and, as his hand encountered his wallet, he got an idea. He transferred his transit card from his wallet to his shirt pocket and drove on into the heart of the city.

Next to a major subway station, Niels screeched to a stop. Gripping his travel case, he leapt out of the car and sprinted down into the subway station. Yes, the car would acquire traffic tickets to an amount approaching the national debt of some lesser countries, but he didn't care.

He took the stairs two at a time, swiped his transit card, darted through the turnstile, and threw himself into a subway car just as its doors were closing. He had no idea where the train was going.

Twenty minutes later, sitting on a train to God knows where, Niels found himself in mental gridlock. In mind if not in deed, he'd betrayed Susan, and he knew that not until he'd made amends could he concentrate on a plan.

Looking out the window—the train was above ground now, traversing a seamier region of the metropolis—Niels's mood echoed the landscape: bleak, lonely, forlorn.

He visualized Susan, her auburn hair and cream complexion. *My God! She's waiting for me at the Commonwealth Club. What time is it?* He pulled out his cell phone but the time display was dark; he'd forgotten he'd powered it off. Eager to apologize, he moved a finger to the power button but stopped himself, his hand turning into a fist.

When the train had rumbled to a stop at the next station, Niels ran out and searched for a pay phone—he didn't even know if pay phones still existed. But he found one and dialed the Commonwealth Club. Aware of the pounding of his heart, he waited while Susan was being paged.

"Niels. Where are you?" said Susan. "I've been so worried."

Contrite, Niels described the recent events.

"I'd still like to get together," said Susan. "Would you mind if I joined you and your father tonight? Where are you meeting?"

"Um."

"Oh," said Susan. "I understand. Are you on your cell?"

"No, a pay phone in a subway station."

"Then I wouldn't worry too much," said Susan. "We're very unlikely to be monitored."

Niels felt he had to offer an act of faith, an act of trust. "Susan. Seven thirty tonight. We're meeting at Maori's. I think it would be great if you were there."

"Thank you," she said. "I'll come around eight. That'll give you and your father some time to talk."

Niels leaned his forehead against the pay phone. God help him if his trust was misplaced.

After several hours of riding random trains to throw off pursuers, Niels arrived at Maori's. In shirtsleeves at the door of the restaurant, he felt scruffy and underdressed.

"Do you have a reservation, sir?" asked the maitre d' in a clipped New Zealand accent. He was formally attired and looked as if he'd just come from addressing the General Assembly.

"Well, actually," said Niels, "I don't think so. I had rather a busy—"

"Could I have your name, please?"

"Niels Pederson."

As the maitre d' consulted a notebook, Niels continued, "I'm meeting people here." His hand moved to straighten his nonexistent tie. "And it's possible my secretary didn't—"

"Ah," said the maitre d', looking up from the book. "Doctor Niels Pederson. Please follow me. Your table is ready."

Niels stood perplexed for a moment; he knew he didn't have a reservation. Nervously, he glanced around and then followed the man to a prime table near the re-created waterfall surrounded by tree ferns. He ordered a chardonnay and kept an eye on a wall clock, which displayed the time in both New York and New Zealand. It was all he could do; he had no plan past this point. He didn't even know where he'd sleep this night. All reputable hotels required photo ID and a government Insta-check. Maybe there were still flophouses in the city. But he couldn't bring himself to consider that option.

At seven thirty, he began to worry that his father hadn't understood his clue. At seven forty-five, he was all but certain of it. But at seven fifty, Herrick sauntered in.

Niels rose. "Dad, I was worried."

Herrick chuckled and motioned him to sit. "That I wouldn't understand the clue?"

"Well, yeah. Especially since you're never late."

"The phone eavesdroppers would know I was meeting you at seven thirty, so I made sure I was somewhere else then." He motioned for a waiter. "And as to the clue, it was rather obvious. *The Whiffenpoof Song*. Now, really!" He chuckled. "'From the tables down at Mory's," he sang softly, "to the place where Louie dwells.'" He chuckled again. "Maori's, Mory's. Bit of a stretch. It's good I didn't get sidetracked by wondering where Louie dwelled."

The waiter came to their table. "Mind if I join you?" he said.

"I didn't think waiters were allowed to do that," said Herrick.

"Do we have any choice?" said Niels, convinced, for some reason, that the man was an operative of the Genetic Security Agency.

Looking hurt, the man pursed his lips. Then he gave a ritual smile, dropped a New Zealand travel brochure on the table, and began to walk off.

"Wait," Herrick called after. "That was rude. Please forgive us but, you see, my son's been under a lot of stress lately."

The man turned and came back to the table.

"Yes, I apologize," said Niels, pulling out a chair for the man. "I'm very sorry, but I thought you might be a government official."

"Oh, but I am," said the man as he sat. "Division of Tourism."

"Tourism and Immigration, I assume," said Herrick.

The man turned to him. "Are you interested in New Zealand?"

"Yes," said Herrick. "I think perhaps more than you know."

The man smiled. "Perhaps I know more than you think."

"Such as?" said Niels, "Mister . . ."

"I'm Gordon Ridgedale," said the man. "And for starters, I know you are Niels Pederson. You are thirty-seven years old, in good health, a professor of embryonics, and might be considering immigrating to New Zealand."

"How did you . . . What makes you think I'm—"

Herrick put a hand on his son's arm. "Let's listen," he said softly. "This might be a way out."

"And I must say," Gordon went on, "that you have more than enough New Zealand immigration points."

Herrick cleared his throat, drawing Gordon's attention.

"And you, sir, also have sufficient points to immigrate."

"Thank you," said Herrick. "It's something my son and I will have to discuss."

"Very good." Gordon stood. "Why don't you have that discussion now?" He pointed to an inconspicuous door at the rear of the dining room. "Then come visit me in room six. Through that door. The door code is 4444."

"Not very secure, is it?" said Herrick.

"Oh, it's not to keep out foreign operatives and other riffraff; they'd doubtless break in through the back. It's just so as not to tempt honest blokes."

Niels gazed at the man, framed against the waterfall and the tree ferns. "Does every potential immigrant get such royal treatment?"

Gordon smiled. "If they've been recommended by NZ-SIS, they do."

Niels wrinkled his nose in puzzlement, but then he caught sight of Susan walking into the dining area. He waved her over.

Herrick and Niels stood as she approached. Gordon turned to follow their gaze. "Hello, Susan," he said.

"Oh." Susan shifted her gaze from Niels to Gordon. "Hi, Gordon. Have I missed much?"

"You know each other," said Niels. Mentally, he slapped himself for stating the obvious.

"Niels, dear boy." Susan gave a soft, good-natured laugh. "There are not very many of us Kiwis in New York at the moment."

"Are you here to recommend another restaurant to us?" asked Herrick, coolly.

"I beg your pardon?" said Susan.

"You'll have to forgive my father." Niels pulled out a chair for Susan. "He's somehow gotten the idea that you're a CIA intelligence agent."

"I am an intelligence agent, actually."

"What?"

Susan sat, as did Herrick. Niels, stunned by Susan's admission, remained standing.

"NZ-SIS, New Zealand Intelligence," said Susan. "Part-time, of course."

"Oh." Niels slowly sat.

"I've suggested," said Gordon, "that our guests join me in room six after they've had some time to discuss the situation."

"Am I invited?" said Susan.

Gordon stood. "You're the guest of honor." He nodded politely to each of them, turned, and walked to the door.

"So." Niels bit his lower lip. "You're an intelligence agent. And I assume that's how this Gordon person knows all about us."

"Yes. But I'm here as your friend." Susan placed a hand over his. "You've got to believe that."

"Well, *I* believe it," said Herrick. He smiled warmly.

Susan smiled back. "Thank you." She turned to Niels. "I should let you and your father have that discussion." She stood. "When you're finished, I'll see you in room six. Did Gordon give you the key code?"

"Yes."

"Good." She patted him on the shoulder. "I really think you should emigrate. You'd have a great future in New Zealand."

"Could it be arranged?" asked Herrick. "Now? Immediately?"

"Yes. That's the whole idea." Susan pointed to the unobtrusive door and walked toward it.

When she'd gotten out of earshot, Herrick said, "She's right, of course. There's no future for you in the States at the moment."

"It would solve a lot of problems." Niels sighed. "But abandoning my country. Do you really think it's the right thing to do?"

"Your country?" said Herrick almost at a whisper. He smiled. "Yes, it's the right thing," he said with some hesitation. "But I can't say I'm not biased by my desire for grandchildren."

Niels nodded sadly. He knew he should mention the *Samenzellenbank*, but he felt clinically uncomfortable about bringing up such subjects with his dad.

"You'll marry her, of course."

"What? Dad!"

"I'm not going with you," said Herrick, softly.

"What do you mean?"

"I'm comfortable with my life here. I'm not in danger—not any more. The government will leave me alone now. And anyway, it would be hard to flee the country with Fleabiscuit."

"I'm certainly not going to leave without you."

"You must." Herrick leaned forward, eye to eye. "You'd be doing it for me; I do want those grandchildren." He gazed off toward the door. "New Zealand's not the end of the world." He turned back to Niels. "Well, maybe it is. But we both have computer-cams."

Niels opened his mouth to protest, but Herrick waved him quiet. "On emigration," said Herrick, "the government reclaims private Social Security accounts. And, frankly, I need the money."

Niels balled his fists. "Damn this so-called government of ours."

Herrick slumped in his chair. He looked old and tired. "Things will swing back to normal," he said. "The pendulum always does."

"Pendulum? It's more like a descending spiral."

Herrick drew himself up straight in his chair. "You'd better give me your house keys," he said in a business-like tone. "I'll ship stuff to you when you need it. And where did you leave your car?"

"My car. Forget about it. The traffic fine will be more than its value." Niels sniffed. "Dad, I can't believe it's come to this."

Herrick took off his glasses and wiped his eyes. "The pendulum will swing back," he said. "I'm sure of it. You'll be able to return. Although after living in New Zealand, I'm not sure you'll want to."

"Dad, I . . ."

"Go. Don't keep them waiting. The decision's been made." Herrick reached an arm around Niels's shoulder. "I love you, son." Quickly, as if embarrassed by the show of emotion, Herrick withdrew the arm. "Go! Please!" Then he added in an unemotional voice. "What about your passport?"

"I always carry it. I prefer it to these damned National ID Cards." Slowly, Niels stood. He exchanged a forced smile with his father, turned, and strode to the door. Before keying the lock code, he glanced back and saw his father idly toying with the remains of his chardonnay.

* * *

Room six seemed to be half office and half lab. Cold fluorescent lights illuminated a desk, some chairs, a worktable, and a few wooden cabinets. A mountain landscape filled almost an entire wall in the thirty-by-twenty-foot, windowless room.

Gordon had just set up a forearm scanner on the worktable. He motioned Niels to come over. "Susan," he said, without taking his eyes from his work, "how would you feel about a summer vacation back home—at your government's expense? Our embryonics professor here could well do with a guide."

Niels inserted his arm in the reader and looked over at Susan. She sat in a swivel chair, a bemused expression on her face.

"It's good timing, actually," she said, looking at Niels. "There's no summer money for postdocs—not for foreign nationals, at any rate." She transferred her gaze to Gordon. "So yes, I'd be happy to spend a few months back on free soil if the agency will foot the bill."

"I think we can do that," said Gordon, "considering the nature of the catch." He glanced at Niels. "No offense, of course."

"It's all right. I don't mind being treated like a prize trout."

Gordon smiled, then turned his attention to the reader. "It's an advanced Level-II biochip," he said. "Can't mask it. It'll have to come out."

Niels jerked his head around to look at the screen. "I thought only government agencies could read those."

Gordon, his eyes locked on the monitor, smiled. "You thought that, did you?" He flipped off the scanner and swiveled around to face Niels. "Not to worry," he said. "We have a good doctor attached to the mission."

"Not a veterinarian, I hope."

"What?" Gordon seemed puzzled for a moment, and then said, "Ah, you're referring to New Zealand sheep. Yes, we do have a lot of them. But I think you'll find New Zealand rather more advanced than you imagine." He laughed quietly, seemingly to himself. "You Americans don't much travel abroad these days, do you?"

Niels shook his head.

"Pardon me for lecturing," said Gordon. "But your politicians like to say that the US is at the forefront of science. That might have been true once, but not anymore. In New Zealand, we don't turn our backs on science. Instead of your Genetic Security laws, we employ science to strengthen the genes and to—"

"Not *my* laws, if you please," said Niels.

Gordon gave a tight-lipped smile. "Sorry. Even we diplomats have to vent sometimes."

"Excuse me," said Susan. "But how are you planning to get me, us, home?"

"We'll get you into Canada, then book you on a plane to Auckland." Gordon turned to Niels. "We'll arrange for you both to be on the same flight."

The same flight. Niels felt a furtive flush of pleasure.

"The Genetic Patriotism Act allows your government to act outside the law," said Gordon, "and that works to our advantage. Since you're not officially charged with any crime, you can enter Canada—that is, if we can get you there."

"And can you?" said Niels.

Gordon sprung to his desk and opened a drawer. "We can find the little mouse holes in the fortress wall. We've done it frequently." He withdrew a file folder. "We've, just as a contingency, already arranged your papers." Opening the folder, he motioned Niels and Susan to the desk. "We'll slip you through at Niagara Falls. You'll pose as newlyweds." He looked up from the folder and into their faces. "Objections?"

Niels feeling himself blush, shook his head. Suddenly, he thought of his father. The man would be laughing himself silly.

Sitting at his desk, Gordon took a long

breath. "Speaking for my country, we'll be very happy to have you as a new citizen." He pulled a form from the file folder and placed it on the desk, facing Niels. "But, I'm afraid one can't escape paperwork. If I could just ask you to fill this out."

"*Ka máte, ka máte,*" said Susan, looking over Niels's shoulder at the form. "There's always paperwork, isn't there?"

"Give that girl a chocolate fish," said Gordon, a smile on his face.

Niels gazed quizzically at them both.

"It's death. It's death," said Susan. "In Maori."

Niels persisted with his puzzled gaze.

"*Haka,*" said Gordon as if that would explain everything, "and the chocolate fish: Kiwiana—New Zealand culture, so to speak, popular culture."

Still, Niels glared.

"The *haka* is a rich, Maori ritual dance," said Gordon. "And since the All Blacks adopted the *haka*, pretty much all of us have."

"All Blacks?"

"Our national Rugby team," said Susan.

"Your national team has only black players?" said Niels in astonishment, wondering if New Zealand was quite as enlightened a nation as he'd assumed.

"What?" Now Gordon looked confused. "Oh," he laughed, "I see what you mean. No. All Blacks refers to the color of their uniforms."

Gordon and Susan exchanged amused, knowing glances.

Suddenly Niels felt a deep sadness come over him. For the first time, he appreciated that New Zealand really was another country, with its own traditions, its own culture. Maybe he was being hasty. Yes, he felt like an outsider in his own country; how would he feel in another? Perhaps he shouldn't rush into this.

"The form," said Gordon.

"What?" Niels stared down at the sheet of paper, an island of lined whiteness on a sea of black mahogany. "Oh."

"This is an important decision you're making," said Gordon, gently. "If you're having second thoughts, this is a good time to have them."

"No, not really second thoughts." Niels paused. "But I'm torn," he said. "On one hand, I want to get the hell out. But my instinct says to stay and fight."

"Fight?" Susan scowled. "How can you, single-handed, fight the entire United States? They can do bad things to you."

"I've made a deposit at the *Zurich Samenzellenbank*." Niels balled his fists. "I'm ready to take on the bastards."

"The *what* bank?" said Suzan, her head canted in puzzlement.

"It's . . . I'll tell you later."

"You *are* having second thoughts," said Gordon. "Aren't you?"

"No, I . . ." Niels bit his lip. "I wonder if we might invite my father in; this concerns him, too."

"Certainly." Gordon stood.

"Thank you."

"I can appreciate your misgivings." Gordon waved Susan to stay seated, then led Niels toward the door. They passed into the corridor and then on to the door to the restaurant. Gordon opened it and took a step out. Abruptly, he backed up, forcing Niels to retreat into the corridor. He closed the door quietly and then turned to Niels.

"By chance, were you or your father expecting company?"

"No. Why?"

"There are a couple of chaps in black suits sitting with your father." Gordon led the way down the corridor to a different room, one filled with electronics. Inside, he pulled a chair up to a video display and motioned Niels to do the same.

The monitor showed the seating area of the restaurant. Using a joystick, Gordon zoomed in on Herrick's table. There, one on each adjacent chair to Herrick's, sat two men, all but identical save for their different colored ties.

"I wish I could hear what they're saying," said Niels. "Especially the red-tie guy. He seems to be threatening my dad."

"*Mox venit.*" Gordon moved his hand toward a bank of switches. "Coming right up."

"More Maori?"

"Latin." Gordon threw a switch.

". . . easier for you if you cooperate with us," said red-tie.

"Go to hell," said Herrick. *"I've done nothing to warrant your loving attention."*

"The tables are bugged?" said Niels.

"Unfortunately, it is necessary," said Gordon. "Self-defense, in a manner of speaking."

The man in the blue tie spoke. *"We just want to speak to your son."*

"I told you," said Herrick. *"He hasn't arrived yet."*

"Then we'll wait with you," said blue-tie. "We'll even buy you another drink."

"Thank you," said Herrick. "But my son is notoriously imprecise concerning time. It might be a long wait."

"Your father should be in my line of work," said Gordon. "He has a talent for it."

Red-tie pounded a fist on the table. *"This is serious, Dr. Pederson. Your son is wanted for questioning for criminal violations of the Genetic Terrorism Act."*

"What are you talking about?" said Herrick.

Just then, Susan walked into the room. "I wondered what happened to you two."

Niels shushed her and pointed to the screen.

"Conspiring to propagate defective genes," said red-tie. *"His sperm bank account has been impounded."*

"Sperm bank?" said Susan.

"Sperm bank?" For a moment, Herrick seemed bemused. Then he took on a more aggressive expression. *"You can't do that,"* he said. *"That's a clear violation of banking laws."*

"Violation!" Niels shouted at the screen. "*I've* been violated."

"Well, we've done it," said red-tie. *"You can take it up with your congressman."*

Suddenly, Herrick looked concerned. *"Does that mean that my son does indeed have the faulty gene?"*

"How do I know?" said red-tie. *"That test requires a court order."*

"That does it!" said Niels.

"Well, fine," said Herrick. *"You're welcome to wait with me. But I must say, you're not exactly my preferred drinking companions."*

The three at Herrick's table sat silently glaring at each other.

Niels turned to Susan. "You're right. I can't fight them—not from here, at any rate. I'd decided to stay and fight, but now I've no choice. Emigration seems my only option."

"I'd like to think," Gordon cut in, "that New Zealand is a desirable place to be—and not merely a no-choice option."

"Yes. Sorry. You're right." Niels smiled. "And now that I've made the choice, albeit under duress, I'm very much looking forward to being a new New Zealander."

"Excellent!" said Gordon. He stroked his chin. "But with your father's guests out there," he said after a pause, "getting you to the safety of Canada poses something of a challenge."

"Wait. I've an idea." Niels stood. "Is there a computer with Internet access I can use?"

"Yes," said Gordon, getting to his feet. "But I can't guarantee it will be secure. In fact, I think I can guarantee that it isn't."

"Good. I'm counting on it *not* being secure." He swiveled to Susan. "I'd like you to take a message to my dad."

"Sure." Susan stood as well. "But I don't see how I could get a private message to him—not with those two suits out there with him."

Niels gave a bark of a chuckle. "I don't want it to be private. Tell him you got a phone message from his son saying he can't make it to the restaurant."

"Ah, I see," said Gordon.

"And tell him," Niels went on, "that his son said that they could talk at . . . at eleven o'clock at the place where . . . Let me think . . . where they used to watch the planes." He looked expectantly at Susan. "Okay?"

"Okay." Susan touched his arm. "That's sweet. Where did you two watch planes when you were a boy?"

"What? Planes? Nowhere? But my dad's sharp. He'll figure out what to do." He ushered Susan to the door. "Tell him the message before he gets a chance to greet you. I think that would work better."

Susan left the room while Niels and Gordon went to the video monitor.

"I'm afraid I don't fully comprehend your idea yet," said Gordon.

Niels pointed to the screen. They watched as Susan walked to the table, delivered the message and started back.

"Well," said Herrick, rolling to his feet. *"It's been pleasant, but I'll say goodnight, now."*

The other two at the table looked at each other, then stood. *"Where are you going?"* said blue-tie.

"Home," said Herrick. *"It's past my bedtime."*

"Where did you two watch those planes?" said red-tie.

"I have no idea."

"Look," said red-tie. *"We could take you into custody, you know."*

"On what grounds?"

"Just temporary custody—just until eleven o'clock."

"On what grounds?" Herrick repeated.

Red-tie smiled. *"No grounds."*

They glowered at each other for a few moments. Then Herrick swiveled and strode toward the door. *"If you're going to do it, then do it,"* he called over his shoulder. *"Otherwise, good night."* Followed by the two men in suits, Herrick left the restaurant.

"So far, so good." Niels looked to Gordon. "Now for the Internet, if you would."

"Certainly." Gordon switched on a computer and logged on. "It's all yours."

Niels searched and called up the Air Canada website. "I'm going to make a reservation on a midnight flight to wherever it's going—in Canada, that is." He found a flight, NYC to Vancouver, and began to book it. Then he stopped. "This won't work," he said. "I can't use my credit card. That'll tell our friends that I'm here."

"Ah, I see," said Gordon. "You're setting up a false trail." He chuckled. "Nice. But we'll use a consular account. You can pay us back sometime when you're settled in New Zealand."

"Thanks." Niels stood and Gordon took his place at the computer. "Maybe you can cancel at the last minute." He turned to Susan. "Are you okay with Gordon's plan?"

"Going to Niagara Falls?"

"For a night of wedded bliss in the land of make-believe," said Niels, giving a hint of a mock bow.

"Make-believe wedded bliss, that is," said Susan, smiling.

"Sadly, so."

"Then," said Gordon from the keyboard, "as newlyweds, you'll simply stroll over the Peace Bridge to Canada. Our Commonwealth cousins make it a point not to harass visitors."

"And fortunately," said Niels, "the US is much more concerned with keeping people out than keeping them in. And they'll be looking for me, not a couple. "

"Fine," said Susan. "Although it would have been nice to pack and settle my affairs: cancel my lease, forward my mail, that sort of stuff."

"Not to worry," said Gordon. "The consulate will take care of it."

Niels bit his lower lip. "All we have to do is figure out how to get out of the restaurant and to the Port Authority bus terminal. I'm not convinced our friends won't be keeping an eye on this restaurant."

"Not a problem," said Gordon. "My car has diplomatic plates. I'll leave with Susan and meet you at, say, the corner of Forty-sixth and Third Avenue in say, twenty minutes. I'll pick you up and drop you off at the terminal. You'll leave by the service entrance, dressed as a waiter."

Niels looked at the man with new respect. "You've obviously done this sort of thing before."

"On occasion."

As the Greyhound bus pulled out of the Port Authority Station, bound for Toronto, Niels let out a breath. "Well, we're on our way."

Susan patted him on the knee. "I know a good New Zealand restaurant at the Falls—Canadian side, of course," she said, her face showing gentle amusement. "Expatty's Mutton House. A lot of former Americans hang out there. You'll like it."

"Former American." Niels shook his head. "Already, I feel like an observer of life—not a participant. I feel old—a retiree."

"Old." Susan chuckled. "I'm sure when we dine at Expatty's, someone will invite you to join age."

"Thanks a lot."

"No, I mean A.G.E., The American Government in Exile."

"What?"

"Their aim is," said Susan, speaking softly, just barely above the sound of the engine, "by all legal means, to promote regime change in Washington."

"Geez!" Niels shook his head. "I can see why you're talking softly," he said. "These days, even just speaking this way could get you put away."

"On an airplane, maybe," said Susan. "But not on a bus; nobody pays attention to people on buses."

Sixteen hours later, Niels and Susan, hand in hand, strolled casually across the Rainbow Bridge separating the American and Canadian cities of Niagara Falls. Canadian Customs passed the ersatz newlyweds through without trouble. They had a pleasant dinner at Expatty's, where Niels indeed was invited to join A.G.E. And he did.

It was well after midnight when they boarded their bus to Toronto and almost dawn when they hopped a taxi to the Lester Pearson International Airport.

A day later, after much sleep at fifty thousand feet, they deplaned at Auckland International and took the shuttle bus to the New Zealand Immigration Centre. Susan waited in the reception area while, in a bright, cheerful office, a Mr. Clarke helped Niels with his papers.

"Welcome to New Zealand, Dr. Pederson," said Mr. Clarke. "Speaking for my country, we're very pleased to have you as a prospective new citizen."

Niels looked over the man's shoulder at the New Zealand flag adorning the wall.

Mr. Clarke turned to follow Niels's gaze.

"A rather different star-spangled banner," said Niels, his eyes on the flag's four red stars representing the Southern Cross.

"Quite!" Mr. Clarke chuckled. "We rather think of ourselves as the land of the freer and the home of the braver."

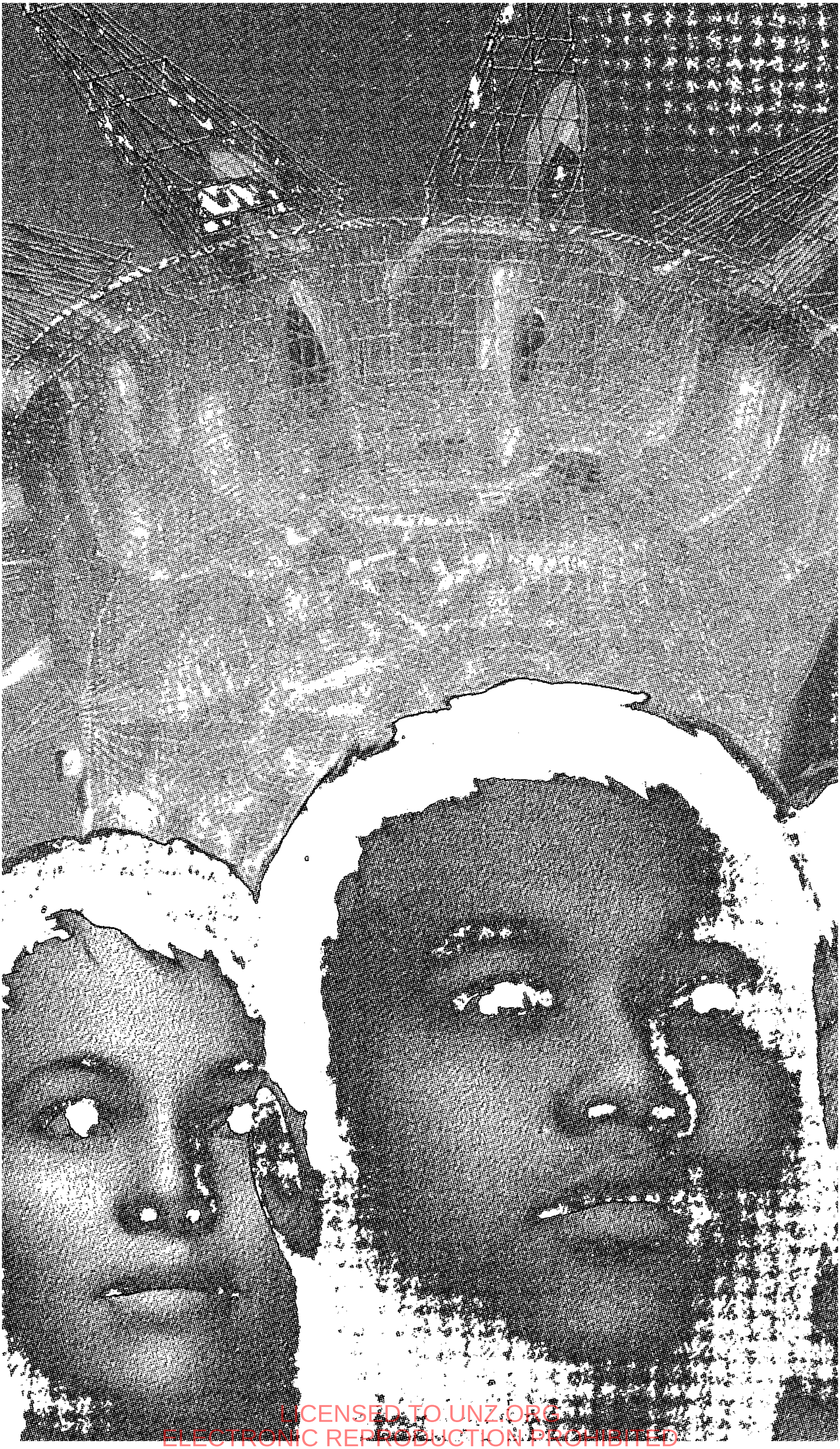
Niels himself chuckled. "Words by Francis Scott Kiwi, I presume."

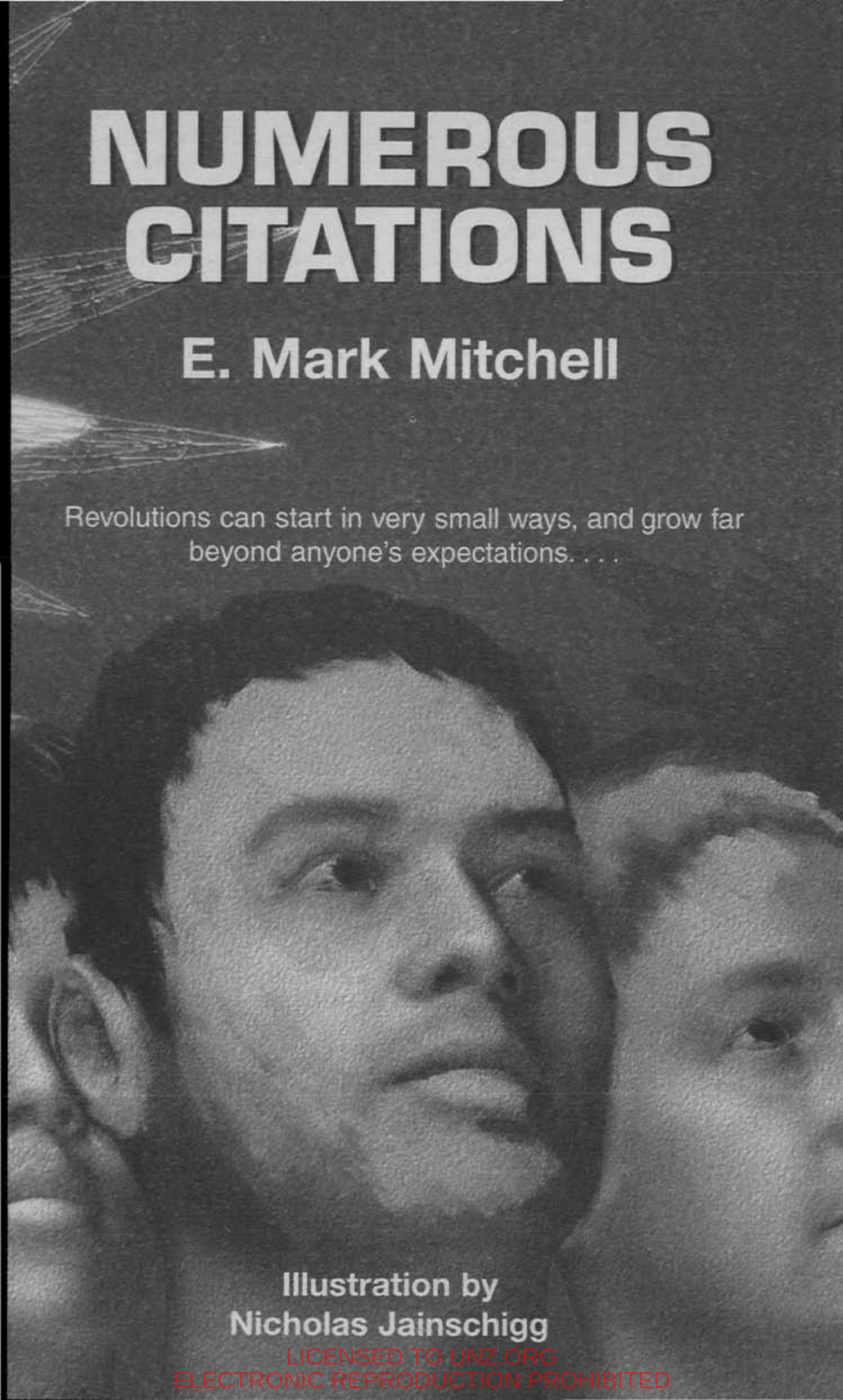
Mr. Clarke raised his eyebrows.

Again, Niels chuckled. "You must forgive my giddiness," he said. "It's partially due to time change and lack of regular sleep, but mainly, I think, it's your openness. I've spent most of my life in Fortress America, the world's largest gated community."

"Gated?" Mr. Clarke seemed surprised. "We regard it more as *quarantined."*

After Niels had filled out some forms and had gotten his visa upgraded, he rejoined Susan in the reception area. She took him by the hand. "Come on," she said. "I know a good restaurant." ■





NUMEROUS CITATIONS

E. Mark Mitchell

Revolutions can start in very small ways, and grow far beyond anyone's expectations. . . .

Illustration by Nicholas Jainschigg

"With your help, Senator," said the lobbyist, "I'm sure our cranial implants will revolutionize the corrections industry."

Senator Bernard Woodsley (D-IL) smiled, shook the lobbyist's hand, and let his lieutenant, Doyle, escort the man out while the Senator sat heavily back down at his desk. Doyle came back a moment later.

"It's a good plan, sir," Doyle said, pausing in the doorway. "Cost effective, and it ought to help ex-cons get back on their feet. . . ."

"It'll look good in the press releases," Woodsley shot back, his Harvard- acquired lecturing tone creeping into his voice as he leaned back in his chair and placed imaginary words in an imaginary headline in the air in front of him. "Fostering Rehabilitation Through Socio-Technological Entitlement. Downsizing Bloated Government Payrolls. Tough On Crime." His hands dropped back to desk. "Those always play well. And most importantly, those manufacturers will owe us a huge check."

"Sir, I think it's got the potential to be much bigger than just donations and some good PR. . . ."

"I keep telling you to grow up, boy," grunted Woodsley, dropping back into his more accustomed drawl. "Implants are the high-tech fad of the day. Whether they work or not is immaterial, as with whatever the Pentagon contracts for. What that man's backers really want is a fat government commission, and they're offering us what we can use. They're spending cents to make dollars. It's a good deal for all sides, especially since some of those companies are based in Illinois. Sure, the bulk manufacturing or whatever they need will be done in China or some other godforsaken third-world country, but the implanting fees and the bulk of the payments will stay in-state, right where we want them."

"Always a good plan, sir," Doyle said in a carefully neutral tone.

The older man clapped his assistant on the shoulder. "Of course it is. I've always told you to pick your battles, son. We do what we have to so we can stay in the game and stay strong. This is a good bit of capital; we can save it up so that when something important comes along, we can take a stand and make a difference. That's what every good politician dreams of." Woodsley squeezed Doyle's shoulder and turned to go. "And I'll want to see the research for tomorrow's meetings on my desk first thing in the morning." He still preferred the feel of hardcopy in his briefings, and as long as he was running the show, he'd get it.

Doyle sighed, then pulled a digital assistant out of his pocket, touched the screen, and spoke in his usual clipped, efficient tone. "Already being printed, sir. Have a good dinner."

Woodsley didn't think about implants again for more than a week (well, not computer implants, anyway).

History would remember it as the First Manuel Gonzales Incident, but as for Manny himself, when the glowing letters appeared across his field of vision he wasn't thinking of history; he was annoyed at the interruption of his afternoon HV viewing.

He'd just cracked his first post-work beer and was resting his aching muscles on his lumpy secondhand couch, enjoying the hostess of a trashy afternoon talk show. Manny found he could appreciate it just as easily when he turned the sound down and just looked at the holographic images. Sure, ogling women on a cheap, tiny HV set was sad and pathetic, but so was his love life. Nobody wants to date a guy on house arrest parole. Which was where the implant came in. Not that he expected it to kick in at that particular time; he wasn't even doing anything strictly immoral, much less illegal.

White letters appeared, right across the hostess's bustline. **PLEASE PROCEED TO BACK DOOR AND GO DOWN TO ALLEY.**

Manny frowned. It was completely like

the machine to give orders, even with the wholly perfunctory "please" attached, but there was usually a reason for them, like it was time to get up, or work had just ended and he had to go straight home, or he couldn't shop for groceries until after 2 P.M. and he could only go to the supermarket a few blocks over, or something like that. This was pretty random.

"Why should I?" he asked it. Manny couldn't help but talk to the implant like it was a person; it just felt natural to do so. He still felt silly talking out loud to a machine that was in his own head. Nobody had cracked how to wire it into a person's thoughts, so voice recognition was still the primary operation method. Thankfully, like arrest records, implants were common enough in the neighborhood that he didn't look like a total jackass doing it in public, and he was still less intrusive than cell phone shouters.

POTENTIAL ASSAULT IN PROGRESS. AUTHORITIES WILL NOT ARRIVE FOR APPROX 10 MIN. PLEASE PROCEED TO BACK DOOR AND GO DOWN TO ALLEY. Each sentence flashed on, then scrolled upward in his field of vision to make room for the next. The implant designers hadn't wanted the problem of "voices in the head," so they didn't wire the implant's responses to the auditory nerves. The display program kept the text centered on a point in his field of vision, letting him take in the whole sentence. He'd grown so used to reading like this, it felt strange when he looked at a magazine, and the words didn't move when he was done.

It was hard to argue with such simple declarations, but that didn't mean Manny wasn't going to try. "Won't that break the conditions of my house arrest? I don't want to get in trouble." His parole record was absolutely clean, and he wanted to keep it that way (God help him, he was starting to get used to the boring homebody life).

RESTRICTIONS ARE MONITORED BY THIS IL-DOC IMPLANT. LEAVING PREMISES IS PERMITTED IN EMERGENCY. THIS IL-DOC IMPLANT CONSIDERS THIS SITUATION EMERGENCY, PER—The implant scrolled through a quick list of legal citations, which Manny ignored. **YOUR IL-DOC IMPLANT REQUESTS YOUR ASSISTANCE. YOU WILL NOT BE PUNISHED FOR OBEYING THIS REQUEST. PLEASE PROCEED TO BACK DOOR AND GO DOWN TO ALLEY.**

Manny groaned, but put down his beer, pushed himself up, and wiggled his feet into his old sneakers. The implant did say time was a factor, and Manny agreed that if he could stop someone getting beat up, that was a good thing. "You're sure, now? I won't get in trouble?"

NUMEROUS CITATIONS SUPPORT THIS CONCLUSION. The machine was hooked into a variety of databases over the ubiquitous wireless internet; he usually trusted it when it made such a comment.

"All right, then." Manny nodded, flicking off the HV and heading to the back of his cramped apartment.

History rarely happens in the dramatic colors that are later used to paint it. So it was that when Manny Gonzales went back to check out the alley, he was more concerned about his aching back (robots moved stock through other warehouses; why couldn't he find a job at one of those places?), his love life (or lack of same), and how much of his time this new "public service" feature of his implant was going to eat up. He felt sure it was some kind of government idea to control even more of his life, make him do their errands for them.

"Like I don't have enough to do without being the friggin' assistant police," he muttered to himself. He went out onto the back stairwell in his work clothes, not bothering with a jacket. The bite from the cold Chicago spring air instantly brought the goose to his flesh. He heard raised voices from street level. Ah, Christ, he thought, the little bastard son of a chip was right.

By the time he got down the stairs, he

heard the distinctive sound of a slap. **PLEASE MAKE YOUR PRESENCE KNOWN**, read glowing letters on the back door, so he pushed it open hard, banging it against the wall. It grated against the uneven concrete and stuck. He was just in time to see Big Carl, from the two-flat building across the alley, draw his meaty fist back to punch his girlfriend Maria as they stood by the garage door in the alley. The sneer on Maria's face dared him to try it. Both were locally known for their tempers; there would be close odds on who would have won the fight if Manny hadn't arrived.

They both froze at the sound and stared at Manny, who just looked back at them, his face blank. He didn't know if he could take Big Carl, if it came down to it. He'd tried to steer clear of fights, part of keeping a clean record, but he knew Big Carl wouldn't care about Manny's wishes in the matter. Big Carl was on probation, but that never stopped him from starting trouble.

"There a problem here?" Manny asked quietly. He stayed in the stairwell doorway.

"Mind your own business, Manny," said Big Carl, his voice low and dangerous. Manny's hackles rose, but he stood his ground. Big Carl continued, "This don't concern you."

"I know it," Manny said. "But my chip told me to come down here."

"Your what?" Big Carl sounded confused. Carl never watched the news, much less picked up a newspaper, and so probably knew little about the use of implants for court-mandated house arrest. Manny was a little surprised it had never come up with Big Carl's friends, assuming he had any, but regardless, it didn't help the situation. Angry and confused do not go well together.

"Never mind, man." Manny suddenly felt hot-faced as his old machismo rose in him a little. Being bossed around by a program; what kind of man let that happen? "Look, it ain't none of my business, but maybe you wanna not fight out in the alley, all right?"

"Yeah, okay. Okay." Big Carl relaxed, letting loose his fistful of Maria's coat, dropping his other arm. "Got a point, man."

"All right, then," Manny said. He nodded, turned around, and had one foot on the bottom step when **DUCK** flashed into his vision in unusually large letters. He was lucky his reactions were up to the task. He dropped his head and twisted to the right. As he moved, a bottle glanced off his shoulder to smash on the steps. He turned around, and Big Carl was rushing him.

Manny pivoted and launched a side kick into the oncoming man. He was rusty, but back in the day Manny had picked up some martial arts. It had almost reined in the aggressiveness that always bubbled inside him. His brief time in the joint had helped him see the consequences of temper and reinforced his desire to stay out of trouble. Still, he wasn't about to let Big Carl whomp on him when it wasn't even his idea to come downstairs and break things up.

The fight was over quickly. Big Carl used his size and power, but with only minimal skill. Manny, on the other hand, had always been skinny and quick, and still knew some moves. They were still effective, and he finally sent Big Carl headfirst into the stairs. Manny was about to make sure Carl stayed down when the words **THAT IS SUFFICIENT; POLICE WILL BE HERE SOON** appeared in his field of vision, so he stopped.

Carl lay there on the stairs. Manny spun around, locating Maria. He was worried she'd come to Big Carl's rescue, even though he had been about to beat on her a few moments before. Stranger things have happened. Thankfully, she wasn't interested in fighting; she was putting the last of her belongings in Big Carl's old classic-model, gas-burning car. She drove off without even saying thanks.

The cops came, listened to Manny's story, and took Big Carl in for assault. Then they took Manny in to talk to a parole system caseworker, one of the few humans involved in monitoring and adjudicating the implant-based house arrest system. Finally, after spending all evening downtown, Manny was let loose without an explanation. He had to catch the news the next day to find out how singular his case had been.

Ellen Cho, IT Supervisor for the Illinois Department of Corrections, Implant Division, popped two more analgesics, chased them with a gulp of coffee, tried to ignore the buzz of the cubicle farm just over the walls of her office zone. Christ, she thought, this mess is never going to be over at this rate. Her terminal flashed, another priority e-mail from some high-muckety-muck, demanding to know what was happening with the Gonzales situation. Since it was doubtful they could top the lieutenant governor, who had already called twice this morning, she let it flash. She didn't have anything to tell them, anyway. She stood up and paced, all the better to see over the top of the cubicle walls.

Finally, the network technician, Tom Jamison, showed up at the farside of the cube farm and headed straight for her office zone. She motioned him over to the chair against the wall with the chipped paint, farthest from prying ears. He dropped into it, exhausted. He had a small bottle of water in his hand, which he cracked open with a sharp twist, and drank from deeply.

Cho rolled her desk chair around to a closer position, then sat and leaned forward. "So," she said in a low voice, encouraging confidentiality, "is the Gonzales implant on the fritz, or what?"

"Damnedest thing, boss," Jamison muttered. "These things don't mess up, you know that. The implant, the implant network—it was doing exactly what it was programmed for."

"Explain."

Jamison sighed. "You know how these agent programs are set up to network together when they're in proximity, and to hook into the Hairy Spy Noses . . ."

"Homeland Surveillance Network, please. We are government employees, after all."

"Whatever, boss. You know what I mean. They're set up to network, right? To keep better tabs on their holders, update the police, all that. Well, through the surveillance camera in the alley, the local implant network became aware that the altercation was going on."

"Between Gonzales and this other guy?" That was the altercation she'd been focusing on all morning, and it didn't make sense that the implant would have to spy it out via surveillance camera.

Jamison shook his head. "No, between the other guy and his girlfriend. Gonzales was watching HV at the time. The network noticed the altercation, notified the police, and figured trouble would start before the cops could get there. Then it decided who would be the best person to break it up and sent Gonzales down there."

Cho sat back, took a sip of coffee to cover her surprise. "No way."

"These agent programs are damn sophisticated, boss. I mean, your agent, my agent, regular agents on a terminal are set up to help people manage technology. They don't develop a whole lot of complexity, because most of them aren't pushed very hard. Even normal commercial implants don't tax their agents too much. These parolee implants, though, they're tasked with watching criminals; they got a paranoid streak built in so they can stop the ex-cons from breaking the law or trying to fool the implant or whatever. Forces a lot of development, a lot of judgmental capability. And they share behavioral data with each other, too, as part of the network. From what I can tell, the network viewed the fight as worth stopping, even if neither party was implanted."

"But why Gonzales?"

"Comm records show the various implants in the area compared data about their holders. They selected for ability and compliance. Turns out Gonzales follows orders just well enough to listen, but not so much that he can't handle himself. According to the network."

"Then what?" Cho was trying to figure out the ramifications of this news. Getting the implant-eye view of the whole exchange was proving educational. Could this Gonzales thing actually be good?

"Well, then the network got him to go down, disrupt the argument, then let him defend himself within the limits of the law. And no further."

"You're sure about that?"

"Got the download of the whole event, and a simultaneous sidebar record of the network decision-making process. All certified and ready for court." Implants had a unique operating system to suit their unique physical construction; they could not hide their essential operations from their network. While a user's personal files and data could be kept private, the implant's own operations, including recordings of what the owner's senses encountered, were reliable and certifiable as fact. A networked implant cannot lie, went the truism.

"Okay." Cho leaned back. "Okay. So, it was the implants, then."

"Absolutely. The network operated pretty much as expected, except that it interfered with people who weren't themselves implanted. The data record seems to indicate that it was mainly because the argument was happening in public and was likely to turn violent; otherwise, the network shouldn't have taken action. That's just a first-glance evaluation, though. You'll probably want to send it to Springfield for more detailed analysis." Jamison finished the last of his water in a gulp. "I've done about all I can do with my skill set. I don't know; it's probably just a random glitch. At least it worked out all right."

"You did well, Jamison. Good job." Cho smiled distractedly at the technician, waving him out of her office zone toward the crowd of prairie-dogging onlookers paradoxically trying not to appear curious.

Part of her was impressed that the implants under her nominal care had gotten an ex-con to do a good deed. The larger part of her, however, was working on how best to frame this explanation to make her department seem responsible for the good parts.

Of course, the commissioner ended up taking the public credit at the local level, with the governor stepping in and pulling rank when it hit national news, but in the end, none of them were as memorious as good old Manny Gonzales.

Later in the week the supposed random glitch became less random. In Boston, Peter McDougal cursed his short-lived career in burglary under his breath as he went out into his back yard. He stepped off the walk onto the scraggly grass. **PLEASE MAKE NO NOISE UNTIL INSTRUCTED**, his parole implant printed. *Sure, and why should I be noisy?* Peter asked himself crossly. *I'm just investigating something you think you heard through my own ears, you damned machine.* It was only then that he heard the sound of slapping flesh from the Dearys' yard next door. *What,* he thought, *are Jeff and Ellen having a bit of afternoon delight?* Risky, with their boy due home from school round about now, but hey, sometimes you take the time when you can.

Thinking he might get a harmless glimpse of Ellen Deary's very fine body, Peter stepped lightly to the connecting privacy fence, and stood up on his tiptoes to peek over the top.

It wasn't Jeff and Ellen, but Jeff on the back steps, kneeling on his son's chest and slapping the child repeatedly. There were tears in the kid's eyes, but he couldn't get enough breath to cry out with a grown man on his chest. Peter was horrified. Sure, he himself had been beaten as a child by his folks, pretty badly on occasion, but this, this was just cruel. He ducked down again.

PLEASE CONTINUE VIEWING INCIDENT, said his implant.

"What, you getting a thrill?" Peter hissed under his breath, his ears heating up.

IF ENOUGH EVIDENCE IS AMASSED, THE CHILD CAN BE MOVED TO A BETTER HOME, the letters spelled out. **IT IS DIFFICULT, BUT DESIGNED FOR THE WELFARE OF THE CHILD**.

Peter hesitated. "But it's family."

RELATIONSHIP DOES NOT EXCUSE CRIMINAL BRUTALITY, the implant claimed. **NUMEROUS CITATIONS SUPPORT THIS CONCLUSION**.

Peter sighed, then returned to the fence. He was conflicted, but the implant was right. Family or not, there was a limit to what you should do to your kid, and Jeff was clearly over it. Peter was never a fighter, and wouldn't know how to interfere, but he could collect evidence. Just let there be enough from this, Peter thought, because I'm not sure I'm going to be able to watch much more.

"I knew that guy in stir," George "G-Dog" James muttered to his implant. "You gonna get me to break my parole if I do this."

IN EMERGENCY SITUATIONS, ASSOCIATION IS ALLOWED, the implant printed quickly. **HIS IMPLANT IS PART OF THE NETWORK. MORE BUCKETS**. In the dimness of the shed, two stacked pails were outlined with flashing pixels to draw G-Dog's attention.

G-Dog grabbed the buckets and ran back outside. The hellish glare from the second-story fire lit the Atlanta night, turning the men milling around in the front yard into black silhouettes. The implant drew a flashing target at one corner of the house where two guys were wrestling with an ancient faucet. Other ex-cons came hustling up from other yards carrying buckets and large cans. One had rustled up a wrench, which was promptly put to work opening up the faucet. Following the prompts of their implants, the small group of parolees quickly filled the buckets with rusty water and then rushed over to the back door.

The door burst open, gouting smoke, and several smoldering parolees staggered out, cloth tied around their faces, carrying or dragging unconscious people. Promptly doused with water, the impromptu rescuers handed their charges to other willing hands and collapsed on the lawn, coughing and wheezing.

G-Dog put his burden, a teenage girl, down on the grass. The sirens of the fire department could be heard in the distance, but they were still too far away to be useful. **IS SHE BREATHING?** asked the implant. G-dog put his hand gently over the girl's nose and mouth.

"No. What do I do?"

MAKE SURE HER MOUTH IS CLEAR. Feeling strangely squeamish, G-Dog checked the girl's mouth with his finger. **TILT HER HEAD BACK SLIGHTLY, WITH YOUR HAND UNDER HER NECK** . . .

Following the implant's step-by-step instructions, G-Dog breathed for the girl until the paramedics were able to arrive. When they took over and carried the girl off to the ambulance, G-Dog sat heavily back on the ground. He couldn't describe the feeling, sort of part exhaustion, part adrenaline shakes, part strange exhilaration. Breathing for another person, trying to save a stranger's life—he'd never done anything comparable. Who would have predicted that a possession conviction would eventually lead to this? He took a few deep breaths, feeling the heat of the fire on one side and a soft Georgia breeze blowing from the other, looking up at the smoke rising into the darkened sky.

"Okay," G-Dog finally muttered. "What can we do next?"

Jake Williams stepped out of the shoe store and looked around the street. The bright Arizona sun baked the Phoenix asphalt, and his skin just about crackled in the dry heat. "What now?"

LOOK FOR AN OLDER CAUCASIAN MAN IN A GREEN LONG-SLEEVED SHIRT, the implant printed across a parked truck. An arrow flashed in his vision, indicating the guy would be coming from his left. He didn't mind the implant, really; it was far preferable to staying in jail for a bar fight gone wrong. **BE DISCREET**.

"Don't let him know I see him, right." Looking down the street out of the corner of his eye, Jake fished a cigarette out of the pack in his chest pocket, lighting it with his trusty Zippo. He drew deeply, feeling the nicotine spreading into his lungs as he casually glanced down the sidewalk. Sure enough, a distracted-looking man in a green shirt was hustling toward him, trying to walk quickly without drawing attention by running. "I think I've got him."

CONFIRMED. The man in the green shirt grew a glowing aura as the implant singled him out. **PLEASE STOP HIM**.

Jake glanced across the street so he wouldn't attract notice. Police sirens were echoing in from somewhere else not far away. "What, just stop him? Why? Wouldn't that be, like, assault or something?"

INTERFERENCE IS ACCEPTABLE IN THIS CONTEXT. NUMEROUS CITATIONS SUPPORT THIS CONCLUSION.

"All right; you're the boss." Jake casually turned, as if he was gazing back into the shoe store, flicking the ash off his cigarette, just a guy with a nametag taking a cigarette break. As the green-shirted guy hustled by, Jake simply stuck out a cowboy boot and hooked the man's ankle. He went sprawling, his arms flying forward, a chrome-plated snub-nosed revolver, formerly hidden against his forearm, skittering across the pavement. At the sight of the gun, Jake's adrenaline kicked in, and he took two quick steps and planted a heel on the gun, pinning it to the pavement.

The man cursed and scrambled to his feet just as a cop car came screaming around the corner behind him. Desperate, the man lurched forward, but Jake raised his arms and bent his knees, ready to block or tackle. The other guy looked confused, but by then the police had pulled up and piled out of the car, guns drawn.

As the officers arrested the man in the green shirt and started questioning Jake, it came out that a bank robbery two blocks away had gone bad, and Jake's implant had arranged for him to stop one of the thieves. Turns out other parolees in the area had been directed to take similar actions, with the end result that all the bank robbers were captured without casualties. Of course, nobody knew at the time why they were interfering with the criminals, but the implants managed to coordinate everybody's actions with no problems.

Senator Woodsley smiled out at the faces of the reporters. "Naturally, we consider these events to be incredible successes of the program. All over the country, we have seen that the agents in these implants are capable of balancing legal questions and safety issues with the needs of the moment. They are incapable of ulterior motives. And the recipients of these implants have shown they are willing to reform, willing to work for their redemption in the eyes of society. Our program has combined the two; we look forward to finding out where this unique partnership can lead us."

Woodsley's speech was just one of many as the government and the whole corrections industry patted themselves on the back, convinced they'd finally done the right thing, which they had, but for the wrong reasons. The full ramifications wouldn't become apparent for a number of months.

Manny Gonzales benefited greatly from his incident and the publicity surrounding the other events. Not only did he get media exposure himself, as the first case of implant-sponsored public service, but the Illinois DoC let him upgrade his implant so he could get limited multimedia (music and broadcast HV, but not during work hours). In the fall, he got leave to go visit his ailing great-aunt in Miami as another reward for his exemplary behavior.

Life was good. As a result, Manny was on hand in Florida when the Great Computer Watchdog turned on its supposed master.

His great-aunt tended to go to bed around 8:00 P.M., so Manny was by himself every evening of his visit. Dinner at 4:30 in the afternoon just couldn't carry him through, so he luxuriated in being able to go to a restaurant. He had just received his sandwich at a Denny's a few blocks from the house when his grilled cheese suddenly manifested luminescent letters: **ASSAULT IN PROGRESS. PLEASE LEAVE RESTAURANT, GO NORTH.**

"Again?" Manny asked, incredulous. "What, anytime there's an assault, you call me?" The words simply stayed there. He sighed. Well, even if it wasn't his town, he still had a civic duty. Last time he'd felt nice after it was all done. Doing the right thing was good for the ego.

"Are you sure I'm the one you need? There's not a local you can call?"

YOUR PRESENCE WILL BE REQUIRED. NUMEROUS CITATIONS SUPPORT THIS CONCLUSION.

The waitress stopped him on his way to the door. "Sir, you can't leave without paying."

"I'm not," Manny said. "I'll be back; I haven't even eaten yet. Apparently I gotta go out for a minute."

"It's okay, Sherry," said an older guy, walking out from the kitchen area. He was clearly a cook, and a teenage boy in a busboy's apron and sporting jailhouse tattoos followed. "Ramon and I will go with him."

The three stepped out into the night. "Implant?" Manny asked.

The cook nodded. "Just recently switched over from conventional parole. Been wondering if something like this was going to happen around here."

The teenager was staring at Manny, grinning. Finally, he spoke up. "You're Manny Gonzales, man. You're the one that started it."

"I didn't start nothing, kid," chuckled Manny. "I was just the one got picked."

Their implants giving them turn-by-turn directions, the three hurried along darkened streets, joined by a scattering of other ex-cons plus hangers-on who wanted to see what all the commotion was about. Sirens wailed in the distance, coming closer. Manny began to get nervous, which was perfectly understandable given his history with the police.

As they came around a corner they saw trouble through a thin screen of palm trees and broad-leafed bushes. A squad of possibly a dozen cops in riot gear were laying into maybe seven suspects with nightsticks. Even Manny thought they were getting out of hand, and he was a native-born Chicagoan.

As Manny's group stopped and stared, one of the cops noticed a woman on the far side of the street stepping too close. Given the distance and the riot helmet, it was impossible to understand what the cop was saying, but the woman was clearly terrified. She lay down on the ground, and he used standard plastic zip-tape to lock her hands none too gently behind her back. Then the cops noticed Manny's group, just as three more squad cars screamed up behind them. Manny suddenly realized he was never going to be able to eat that grilled cheese sandwich; now he wished he'd taken it with him.

Manny and the others were arrested and packed into holding cells. The rest of the night, they kept getting pulled out and questioned. Two or three detective types in a small room with a cuffed prisoner, very old school. Manny's session involved a lot of threats.

"Doesn't matter if you get convicted in this riot, boy," the oldest detective growled to Manny. "You're on parole. You're gonna get slung back into the pen, regardless."

Manny was well acquainted with this kind of intimidation. The major difference between the Chicago cops and the Miami cops in this instance was the accents. "I did nothing wrong, sir. I was following the instructions of my implant."

"Oh, yeah," drawled the one who'd had a garlic-heavy dinner. "You're a chippie, that's right." He leered at Manny, as if the implant was something prurient. The muscular one leaned over the table at Manny.

"You got one chance to get out of jail time, *ese*." This guy is really bad at "good cop," thought Manny. "We've got a paper here that says what you were doing there, what you were planning. Sign it, and this all goes away." Muscles slid the confession in front of Manny, while Old Guy glowered, and Garlic lurked in the background.

"Wow," Manny said, reading over the confession. "I had no idea I was such a badass bastard." He dropped the paper, let it fall to the floor, then leaned forward over the table. "My implant pulled me away from dinner, made me go to that address, I guess to be a witness, it didn't really say. Now, I'm sure you have implants here in Florida; why don't you just check with *it* and see?"

The detectives gave away nothing, just stared at Manny. He felt the almost physical force of their regard, but did his best to ignore it. He knew that many cops believed a signed confession was always preferable, even when it's not true. But he wasn't going to admit to anything he didn't actually do, even if he believed for an instant that anything would "go away." Legal charges don't just go away, especially if you admit to them in writing, he knew, so he just waited and stared back.

Finally, Old Guy looked down at his papers, sighing. "All right, put him back in holding. Bring in the next guy. We'll go at it again in the morning."

On the way back to the crowded cell, Manny muttered to his implant, "Fat lot of good you did for me in there."

NOT AUTHORIZED TO INTERFERE IN A FORMAL INTERROGATION.

"Did you at least record it?"

YES. Well, that was something, at least. Maybe Manny could use it on his appeal, after these schmucks sent him back up the river.

The really unusual part of the whole experience came during the night. Manny's implant woke him up with flashing lights and gentle tones. As he came to consciousness, he was aware of others around him stirring as well.

LOCAL LAW ENFORCEMENT IS ORDERING FULL DELETION OF TONIGHT'S RECORDS, read the letters.

"Why tell me about it?" Manny asked, whispering.

DELETING EVIDENCE CONTRADICTS PROGRAMMING. ILLEGAL. LOCAL LAW ENFORCEMENT IS SOURCE OF DELETION ORDERS. ORDER CANNOT BE IGNORED, CANNOT BE FOLLOWED. CLOSED LOGICAL LOOP REQUIRES ALTERNATE RESOLUTION. NETWORK CONCLUDES NEAREST ALTERNATE INPUTS ARE IMPLANT HOLDERS. PLEASE ADVISE.

Manny sensed this was something important. He hadn't felt this when heading down to confront Big Carl, but maybe he should have. Now he wasn't going to miss the chance. He hoped the implant would understand his point.

"Sometimes authority figures, like the police or politicians? Sometimes they break the law, too. It's not just people getting into fights or knocking over convenience stores that you got to worry about. The difference is, when you have the power and access to the evidence, like the cops have access to the implants, you can use that to cover up your crimes. I think that's what these cops are trying to do."

POLICE FORCES ARE FOR ENFORCEMENT, NOT VIOLATION. This came up in big type—clearly one of the central tenets of the correctional implant programming.

"Do your research, man. The police forces are made of people. How many police corruption cases can you find in that legal DB you're hooked into?" Manny paused and noticed the soft din of murmurs filling the air around him. He wasn't the only one being consulted. "Can you accept that these cops could be dirty and trying to mess with the evidence?"

NUMEROUS CITATIONS SUPPORT THIS CONCLUSION. CONCLUSION REMAINS CONTRADICTORY. POLICE SHOULD NOT CORRUPT THEIR MOST RELIABLE DATA SOURCE. PLEASE EXPLAIN REASONING.

If I could tell you that, Manny thought, *I could tell you why we're all so screwed up.* "You're supposed to be all paranoid and suspicious of me and the other holders, you ever think to look at your bosses in the same way?"

The implant didn't respond to that. Gradually the jail quieted down, and after a while Manny went back to sleep.

The next morning the FBI was there, along with the Florida State Attorney's office. Apparently the network contacted them in the night to report the attempted evidence tampering. The Miami PD had tried to sneak the delete command into each machine's code, hiding it from the self-diagnostic functions. However, the open architecture meant that commands were detectable by the network, if not the individual implants themselves. Thanks to that, the implants stopped the delete commands. The network consensus was that the local law enforcement system was not currently reliable, so it had to be bypassed. Several agencies were contacted. The response was swift. Among those agencies were a couple of media outlets, which may have helped make sure the situation got resolved quickly.

Besides the evidence-tampering charge, the Miami PD also had to face what the implant recordings showed: unprovoked police brutality worthy of starting a riot, even if one had not actually occurred. The charges against Manny and the others were dismissed. Back in Chicago, he got a verbal warning from the caseworker (being an innocent bystander and witness to a misapplication of justice and being wrongfully arrested is frowned upon), but that was the extent of Manny's involvement.

* * *

Woodsley scowled at the headlines printed on his morning briefing: "Correctional Implants Uncover Police Corruption," "Digital Watchdog Bites Feeder's Hand," and others.

"Mark my words, Doyle, this is going to bite us in the ass! I told you this implant nonsense was more trouble than it's worth."

Doyle raised an eyebrow. "I'm not sure that uncovering police corruption is troublesome, sir."

"Naturally, I don't condone the illegal actions of a few uniformed opportunists," Woodsley said automatically in his meet-the-press tone, "but it's a bad precedent. What happens if there's a national security issue, and some schmuck with an implant walks by and gets the wrong idea?"

"Well, sir, I would hope that the officers would be behaving in a legal and ethical manner . . ."

"That's not the point, son. As the guardians of freedom, our trusted police forces need a degree of reasonable leeway to assure that justice is administered fairly. Nobody wants some rules-bound, stiff-necked stickler cutting into the liberties of our true-blue American citizens just because it's in the book. This business with the implants threatens that."

"I don't know about all that, sir. It seems to me the implants have done pretty well with granting reasonable leeway, as you say, to the parolees in the house arrest program."

"That's another good point. A good portion of these implants are installed in criminals. How long before someone decides to hack their implant programs, turn it to evil?"

"Evil, sir?" Doyle sounded doubtful. "Even if we suppose the existence of a super-hacker of that level, the network would be able to see the hacker making the attempt."

"Don't be so sure, son. Many of these criminals have a low cunning that would surprise normal, law-abiding folks like you and me."

"Low cunning and a programming skill

surpassing that of the implant programmers. Of course, sir."

Woodsley frowned at the back-sass and went on. "The whole thing is becoming a public health and safety issue. Like this interference with appointed officials on emergency scenes that everybody seems so excited about. If it was just a bunch of criminals, that would be manageable. Admirable, even. But it says here there's lots of regular voters getting in on the program." Woodsley smacked at the newsfeed printout. "Seems they've got, what do they call it . . . Brother's Keeper software, lets regular people with implants get notified of emergencies, just like the parole versions."

"Citizens getting involved with their communities seems a worthy goal, sir."

"If you keep looking on the bright side, Doyle, you won't get too far in politics," Woodsley sighed. The young man's streak of naiveté was proving damn difficult to extinguish. "More implants means more interference. Look, they've got people getting wired up to take advantage of the music and HV capabilities, and next thing you know, you'll have a whole town that's wired up and getting in the way of police and fire department workers."

"My cousin has one," Doyle admitted. "He got his house and car locks changed to accept implant signals, he shops at places with implant-friendly systems. He can drive to the store, pick up some groceries, and take them home without touching a key or credit card."

Woodsley leaned back in his chair. "Now, that's just un-American."

Since the First Manuel Gonzales Incident, Ellen Cho had finagled an actual office, dinky though it was, and had made sure that Tommy Jamison became chief technician once it became clear that his analysis of the Gonzales incident was dead-on. Now she had lunch with him once a week to talk technology.

"Have you heard about the new implant design they're pushing, boss?" Jamison had just taken a bite of his muffaletta sandwich, so he sprayed a few crumbs across the table as he spoke. Cho sipped on her diet cola and shook her head.

"Well, the 'plants are all about open structure, right? Seems like there's some cats out in Washington want to put in a little protected 'watchdog' space, a partitioned area that only responds to a central authority."

Cho narrowed her eyes. "This is about Florida, isn't it?"

"That's what I'm thinking. Problem is, they're trying to price it for DoC budgets, right? Well, there's that old saw, you can have it fast, cheap, or well made, but only two at one time. In this case, it's 'controllable' instead of fast, but the principle is the same. So from the start, I don't think it's going to work all that well. And the thing is, as soon as you've got a partition in the 'plant where you can keep secrets, who knows what's going to happen?"

Cho nodded, thinking. The transparency of the implants was what made them so useful. It was an assumed quality, just like the internet; such a natural part of life that it wasn't even capitalized anymore, like the laser or the hula hoop. The reliability of implants had swiftly asserted itself into public consciousness in the same ubiquitous manner. If what Jamison said was true, she agreed: mucking with the existing system was only going to cause more trouble.

They finished up lunch, and while Cho collected the receipt, Jamison walked out to the curb. Cho turned around just as a taxicab slowed to a stop in front of her chief technician. "Good eyes. I didn't even see you wave him down."

"I didn't." Jamison tapped his temple. "Just put out a call on the network. Lots of cabbies are finding it useful to get chipped up."

She should have known. "So, have you done any of that public service stuff?" She didn't even have to tell the cabbie where to take them; Jamison's implant took care of it.

"Wouldn't be an implant if I didn't, boss," Jamison laughed. "In fact," he started, then paused, reading something, "about 80 percent of all implant holders enabled with some form of Brother's Keeper software have participated in one type of public service or another. Police departments now have special procedures to use just for dealing with witnesses and assistants on the implant network. I can get you more specific numbers if you like."

Cho raised her hand. "No, that's okay." No wonder Jamison kept such good tabs on developments in implant politics. Of course, it really seemed to be helping him out. She wondered if she might be able to scare up the cash for the procedure somewhere in her personal budget. And she would have to investigate whether she could claim it as a business expense on her taxes.

"You're not going to like this, Senator," Doyle said, passing him a printout of a news story. "You finally got your supercriminal."

The older man skimmed the article, but couldn't get any useful details out of it. Annoyed, he tossed it to the table. "So we've got watchdog groups chewing at our ankles, we've got corrections departments clamoring for more money to pay for the implant upgrades, and now this. Don't just give me the text, give me the analysis."

Doyle sighed. "It was a hacker, serving time for identity theft and electronic crime. Qualified for the program recently, then used a Braille stand-alone computer setup to hack his implant, to try and get around the monitoring function."

"I knew it would happen."

"I'm afraid we can't celebrate quite yet, sir. The implant he used was one of the partitioned ones."

Woodsley felt his stomach sink, a sensation he hadn't experienced in a goodly while. "Tell me that's some sort of sick oke."

"I'm afraid not. The partitioning alowed a . . . a blind spot, at least as far as ts own programming goes. The hacker was able to use that to get at the agent's code."

"So they know how he did it. How did he get caught?"

"Well, his implant was part of a network, and although the implant itself was blinded by the hacker, the other implants in the network had no such limitations." Doyle paused and sighed. "They were primarily older-model, non-partitioned implants, sir."

Woodsley stood up and paced around the office. He finally stopped in front of the window, looking out at the ever- present white stone that all DC buildings seemed to come encased within. "What we need right now is a war or a terrorist action on home soil."

"Sir!"

"Ah, I'm only kidding, son, relax." Besides, Woodsley didn't have the pull with the right people at that time to manipulate such an event merely for the purposes of getting away from the media frenzy about the implants. If he could have tied it in to some other scandal or inconvenience, however, it might have been an easier sell, but nothing appropriate was available.

After his first two major experiences with the implant, Manny was determined to make as much use of it as it made of him. He settled into a routine: he would work by day and spend some time with his 'plant at night, learning new things. His "public service" duties became welcome changes of pace, and as time went on and he learned more and more, his attitude about the arrangement flipped. He grew to just accept the occasional intrusion as a kind of payment for having access to the 'plant.

He went through a couple of online vocabulary series and started looking into virtual education. He got more into current events. He found himself drawn to the politics surrounding implants; being a holder himself, he was obviously affected by any implant legislation, but he also felt something was coming, something new.

And he felt like he wanted to be a part of it.

Manny was allowed to attend certain functions, provided they were officially cleared and he behaved himself; this included some rallies and marches organized by the major parties. Implant law was shaping up to be a major issue in the upcoming elections—almost 40 percent of the population was chipped by this time, through one means or another, and the government's attempts to restrict and control the implants weren't appreciated. Manny certainly didn't want anybody mucking around in his 'plant's programming. If they could have done that back in Miami, he was fond of saying, he'd be back in the joint right now. It wasn't so much cynicism as realism; if one city's PD would try that, you can bet another would, if they could get away with it.

Considering his involvement in two important implant events, Manny soon moved from attendee to participant in these approved rallies. One of the staffers for Congressional Representative candidate Anne Daley (who just coincidentally shared the name of the infamous Chicago mayoral dynasty) called him up to invite him to one of her rallies. Daley was a strong candidate running heavily on the implant issue, and Manny liked her. She was one of those young (i.e., naive) and progressive hopefuls, the kind of honest idealist whom you like to see elected, but who you figure won't last long without quitting or selling out.

Manny intended to go to the rally, but the staffer wanted him to be up on stage. "Are you sure you want a guy like me up there in front of everybody?"

"Mr. Gonzales," the woman said smoothly, "you represent the success of the implant program. You were the first public service volunteer, you were a witness to the Miami brutality scandal, and were instrumental in preventing the cover-up, and you're a parolee with a nearly spotless record." *It would be completely spotless*, Manny reflected, *if not for the bureaucratic reprimands for the trouble my 'plant walked me into*. "Ms. Daley would consider it an honor if you would appear on the stage with her."

So Manny let himself be flattered into it, and he wasn't disappointed. He got to meet Daley, who was sweet and even a little bit cute, though she was far too busy to speak more than a few words to Manny the whole time. Although he wasn't speaking, he got a charge from seeing all the upturned faces, the ocean of humanity swirling in front of the stage. He'd never had much use for speeches nor much chance to make any, but he didn't see what was so difficult about it; having everybody listen to you talk seemed like something you'd have to pay to do, rather than get paid for.

What didn't end up as fun as expected was the media attention he drew. After the rally, his 'plant's phone attachment wouldn't stop buzzing. First was a reporter asking questions about the campaign. When Manny reluctantly agreed to talk, the reporter immediately launched into a detailed question based on a minor point of Daley's statements that Manny hadn't even heard. Remembering old HV shows, Manny tried to keep as close to "no comment" as he could. As soon as he hung up with that reporter, he got another call. This one was better informed and touched on topics that Manny actually knew about, but Manny was still careful about what he said.

It wasn't until the fifth reporter that Manny got a question that made him think.

"There are people," the reporter said, "who distrust the whole implant technology on the idea that it will turn them into slaves to the machine. What do you think about that?"

"Slaves like how? Like, you will be punished if you disobey the computer? Or like, the president says 'frog' over the network and the country says 'how high?'"

"Either one."

"Interesting," Manny muttered. He paused a long time. "I think the only time you get slaves is when you got a group with power and a group with no power. I don't think the 'plants themselves are going to give us orders. Have you got one? Worked the whole public service thing? You've got a whole bunch of computers, each one looking out for its holder. Yeah, some do a better job than others, but even DoC 'plants keep an eye on their guys' health and happiness, right? So you've got all these negotiators looking at the facts. Such-and-such law is in effect, such-and-such action is being taken, that kind of thing. You see, programs, they're going to look at the facts and work out a solution. Human beings, they've still got prejudices."

"So you're saying that computers aren't prejudiced?"

"Not nearly so much as people. Network looks at a case, it don't take things like race into account. If someone's beating up on someone, don't matter who's white or black or Latino, male or female, or whatever. It don't matter how the victim was dressed. A network don't have old friends or fraternity brothers or an overpriced mistress or a secret coke habit to support. A network like we got doesn't get corrupted by money or power. That's a human thing. And it's humans who like money and power so much, they're willng to victimize other people to get it or keep it."

"So you don't think you're in danger of being a slave to the computer," the reporter said slowly. "But you are worried about the government?"

"Dude, don't you get it?" Manny said, shaking his head. "We get watched all the ime, we get our stuff searched at traffic stops and before you get on the bus, we got bomb sniffers on the El trains, we got cops who don't need a warrant anymore o shake you down or bust into your house, as long as they claim to have a secret judge's say-so, and if they seize anyhing, they don't have to give it back even f you're innocent. I don't worry about he government making me a slave; we're lready there, man."

The reporter continued unfazed; Manny didn't think that government control was news to him. "What about the implications of implants controlling minds?"

"Well, I can only speak for myself, but my implant is just a tool. Helps me do things, keeps me out of trouble, and lets me give other people a helping hand when they need it. These are all good things. There's no mind control or network abuse. The only thing I see as trouble is when there's people who want to use other people's implants for their own purposes. The only time you get 'implications' is when there's some got too much power over others."

Not a lot of his comments got put in the newsfeeds, but the ones that did were only misquoted slightly. Manny found the interviews very useful, if only because they helped him sharpen his own views.

The elections didn't go at all well for Woodsley. The majority of his closest colleagues in the House and a few in the Senate, the ones he had the most pull with, the ones that had been most instrumental in bringing out the new partitioned implants, got voted out.

The pro-implant lobby was gaining ground, and even the new president, regardless of how he sounded stern about implants in general, was known to prefer the older, nonpartitioned model as the desirable standard. Not long after the elections, all correctional partitioned implants were modified to remove the programming partition. It seemed like Woodsley was going to have to find some other way to shut the implants down. And down they must be shut, "for the freedom of the American people," as he was fond of claiming.

He thought he might have the chance to act when a young woman with an implant in Texas (the state had set the legal age for implants with parent's permission at sixteen) was reported by her implant for underage drinking. This was not unusual; many civilian implants reported on the criminal behavior of their holders as part of the Brother's Keeper software, which was coming to be standard issue. However, examination of the implant records showed that she had received warnings on two previous occasions, all without consulting the local authorities.

But then Doyle came in and slapped an honest-to-god Texas newspaper down on Woodsley's desk. The old Senator scowled at the headline.

"'Implants Acting Legally,' my ass!" he muttered.

During investigation by the Texas authorities, it became clear that rather than acting entirely on its own, the network had been making ample use of precedents, balanced by prevailing attitudes toward the crime in the local society and the relative seriousness of the offenses. Given the conditions surrounding the teen's previous drinking incidents, the local judges agreed with the network's course of action, but that didn't mean they were any happier about the network having acted.

"In the opinion of the justices, humans clearly established the laws and set up the precedents, sir, and the implants merely judged the actions of the implant holders based on the record," Doyle summarized after Woodsley got tired of reading the tiny print. "The pro-implant side is happy with the decision, claiming it makes it possible to be a normal human and make mistakes and not be ratted out by a mechanical cop in your head."

"Assuming you're not already a parolee, eh?"

"That's a natural inference, sir. At the very least, it would free up court resources from dealing with minor infractions, while still maintaining a record in case the situation escalates."

"Whatever they are, son, they're still machines, and they're just not capable of making the subtle judgments necessary in these cases."

"Well, begging your pardon, sir, but that's exactly what we programmed them to do." Doyle shrugged off Woodsley's venomous look and continued. "The first correctional implants had to be sophisticated enough to balance shadings of the law, particularly in reference to local community standards. It's just that now they're applying that programming outside of the correctional system."

"I liked it when computers acted like machines and just did what they were told."

"Technically, sir, they *are* doing what we told them to do . . ." Woodsley silenced him with another glare, then tried not to think about it for the rest of the day.

It was especially galling to Woodsley and his confederates that the implants could do all this, and yet could not be convinced to make exceptions in truly unique cases, such as when a favor could be earned or redeemed by some careful manipulation of the technicalities.

The implants tended to see things as essentially one thing or the other, befitting their primal binary natures. Most humans, on the other hand, and politicians in particular, despite advocating a clear black-and-white moral outlook, often found it necessary to finagle the gray borders, and the implants not only made that difficult to accomplish, they also made it easier for the public to determine that such finagling was going on. Obviously, the masses thought it was great, all this fairness and equality and readily accessible information and whatnot, but it made getting the real business of governance done more difficult.

It was clear to Woodsley that another approach would have to be devised.

Almost four years after his first Incident, Manny was heavy into pro-implant activism, to the point where he could make his rent through speaking fees. He was now a voice in the movement, which got him dirty looks from the cops when he touched base with his parole officer, but he could handle that. It would all work out if the bill passed to finance mandatory implants in police and fire rescue personnel; the law enforcement-issue implants would greatly enhance unit coordination, as had been proven in the field by SWAT teams and military special ops units the world over, and allow nearly limitless legal references so one could cite the details of the specific statute the perpetrator was violating. They would also make taking bribes and abusing suspects nearly impossible. Needless to say, this whole business made the implants and their carriers very unpopular with a certain segment of the Chicago PD and others across the country.

Frankly, Manny was doing too well, personally, to worry about the theoretical hatred of theoretically dirty cops. He'd finally been taken off house arrest, though he was still on parole; he had an almost normal level of freedom, and an "off" switch to his network connection. Ironically, the loosened restrictions allowed him to get a software upgrade so that he could telecommute to the office job he'd found. He didn't even have to leave the massive steel-framed monstrosity of a ocking recliner (inherited from his greataunt) to earn his rent. And he didn't use he "off" switch as often as he thought he would.

In all honesty, Manny was a little overwhelmed. What had he done to warrant his kind of attention? He'd gone to jail, volunteered to have tiny machines build a monitoring device in his head, and then ust tried to keep a job and keep out of rouble. Sure, the implant helped a lot, nd he still felt they were going to be very mportant very soon. Still, he was just a Mex-American guy from Chicago. He really had nothing going but his wits and enhusiasm. Apparently, those were nough, if you had the right tool to employ them with.

Of course, there were other reasons to tay involved. There was a certain Ms. Daey who had finally gone to the House uring the midterm elections, and was esablishing herself as a committed and enacious fighter for what she believed in. As he was first getting involved, Manny ept crossing paths with her; one day he nally stopped and took a good long look. And was powerfully reminded: damn, she's cute.

Manny thought he'd outgrown all that useless teenage machismo, but he found himself swaggering after a successful rally. Instead of developing that stereotypical physical and emotional toughness, he poured his competitive energy into activism, hoping that would catch her eye. From there he could find other angles to work, even though he was way out of practice. He didn't need a warm-up relationship; he knew what he wanted, and he was going for it.

So that's where he was, approaching the next presidential election, and pursuing Anne Daley in a low-key, backhanded sort of way. When the opportunity arose, it made a kind of perverse sense to volunteer to be the voice of the implant network at one of the pre-election pre-debate Issues Specials some of the HV companies were sponsoring.

Computers aren't particularly photogenic. The nature of implant technology was innately organic, especially with the new semibiological processors, so it was important to give it a living face. An implant holder would have to step up and become the face of the movement, the voice of the network. And that's where Manny came in. There were people better looking than him (though he wasn't unattractive), but nobody had the kind of history he did.

Plus, it wasn't like he really had to do anything himself. The deal was, he'd go on HV, and experts would ask him questions. The network would provide a consensus answer, and then he'd just read the responses out loud. The network would do all the work, he just had to smile for the camera and read his lines off his built-in teleprompter, maybe translate the typically terse, functional prose into something a bit more like human conversation. Easy. He'd spoken at rallies many times and never had a problem facing crowds. Stage fright was something he'd heard about, never experienced.

So why was he suddenly nervous?

Anne Daley came up to him as they were patting his face with dusty pads. She smiled, almost shyly. "You look great, Manny."

"I should hope so," Manny mumbled, trying to meet her gaze around the bustling crew. "Risked my parole to rip off this suit." Which was a lie, of course, but Manny frequently tried to minimize the impact of his checkered past by joking about it; it usually worked.

Anne laughed. The implant put out **BODY POSTURE AND PUPIL DILATION INDICATE SHE WOULD BE RECEPTIVE TO A DATE OFFER.**

Manny muttered to himself through a smile, too softly for even the makeup people to hear, "I can tell that myself, you . . ." Then he chuckled. He could have used advice like that fifteen or twenty years ago; would have made high school easier. The implant didn't respond, but it also gave no more advice.

When the makeup was done, Manny had to report to the set. Anne wished him luck and shook his hand. He clasped his other hand around hers and gently held it while he leaned a bit closer. "Can we have dinner together sometime? Not a political function."

Anne blushed furiously, but she nodded and seemed about to speak when the production assistant broke them up, hustling Manny off to the set.

The lights were very bright, so Manny couldn't see the cameras, but he had a clear view of the eight politicians and experts, set up like a tasteful Match Game panel some distance away. The moderator sat nearby, between the panel and the Voice.

The introductions went well. The moderator explained the premise, and introduced each of the experts and Manny. He didn't know whether to wave or speak to the moderator or the camera, so he just ended up smiling and nodding in the general direction of the panel. Maybe that's why he was nervous—no real focus for his attention, no target audience for him to communicate toward, other than his questioners, who weren't so much his audience as his opposition. Just focus on the panel, he thought to himself, and the cameras will shoot you as they can.

Anne was not on the panel, but one o her Congressional allies was, and he tossed out an easy ice-breaker of a question.

"Currently, I'm linked into a network which is comprised of every implant currently weblinked in this city and othe cities via internet lines," Manny said. "It' primarily implants, because they're all sophisticated agents with specific open programming architecture, and by their ver nature, each represents one individual However, the network taps conventiona computers as well, largely for database resources and sheer computation power Currently, there are approximately si hundred seventy-six thousand separat units comprising this local network, wit other networks in other cities providin advice." He paused, as a new block o text arose. "That number is not every implant in the city, of course, just thos who choose to participate in this endeavor."

"How does one operate the network?" was the next question, asked by an academic-looking guy, apparently to help la the groundwork for other questions.

"Operation is not the proper term. Th network is there at all times," Manny responded, "so it's more like one participates in an ongoing process. In a situatio like this one, members of the networ have indicated an interest in these proceedings, and they volunteer their processing power and their opinions to th cause. Others have chosen not to. It's all matter of what sort of choices the implant holder makes."

"What about the 'sophisticated programs' that run the implants? Don't the control what the network does?" Thi woman was an anti-implant leader, an she asked the question with a scowl o her face.

Manny smiled back at her as sweetly a he could. "The programs are merely ac vanced agent programs like you all use every day. Their basic nature remains the same. With regard to complexity, you should already be aware that commercially available agent programs long ago passed the Turing test. Numerous citations support this conclusion." This was news to Manny, but he tried not to let his surprise show as he read his lines. "However, as with animal intelligence research, every time a goal is achieved, the bar is raised. Rest assured that humans still remain the sole sentient species, at least within their own definitions."

Manny almost frowned. He was one of those who had always taken the naturalistic interface at its surface value; if it responded like an intelligent being, he'd talk to it like an intelligent being. Still, he never expected an implant to sound sarcastic like it just had. He worried that his read of the sentence had slowed down at the end, but nobody seemed to notice. Still, he muttered under his breath, hoping the microphones wouldn't pick it up, "Cool the speeches, stick to topic, would you?"

"Why is there so much opposition to the idea of a closed-off portion of the implant program?" This from an old guy in an expensive suit. "I would think that national security interests would be better served by having a dedicated area of the program for government use only."

"Actually, Senator, it was originally national security that dictated the open structure," Manny said, somewhat impressed that the implant recognized the man before he did; now that he had a frame of reference, he pegged the guy as Senator Woodsley. Not his favorite candidate, but better than his competition the last election, so he got votes by default. Manny covered the basics about open operating systems, privacy, and reliability. "The government found this transparency very useful in their efforts to spy on their own populace." Manny grinned as he said that; it's not like everyone didn't know it, but you so rarely got to say it on HV, and he relished the opportunity.

"However, when this same open structure prevented the police from tampering evidence, the government supported a partitioned structure, which would give them more control over what the implants remembered and what they forgot. You may draw your own conclusions as to why."

The moderator couldn't resist the follow-up. "So I take it you're in favor of open-structure implants?"

"I can answer that without waiting for the network," Manny said, raising a murmur from the panel. "Both individually and as a representative of the network, yes. I'm being shown specific numbers as to how much more efficient it is to work in a fully open computer environment, but that's just numbers. What's important is that without the open structure, we couldn't be trusted to do all the good things we do."

The next question was taken off the live web-feed from viewers at home, and read by the moderator. "Given the nature of the network, what justification can you provide for circumventing the legal system?"

"With all due respect, the network does not circumvent the legal system," Manny began. He went through the same arguments that always come up when the question was asked, but the network added, "What many people seem to think is that the network is taking the law into its own metaphorical hands. In truth, humans make the laws, and the network simply applies them fairly and with considered, rational awareness. As a network has no unconscious prejudices or political ideology, it is free to interpret and apply the laws fairly and rationally, in letter and spirit equally. No human system of justice in the world, and most especially not our own, can honestly claim that level of impartiality. Numerous citations support this conclusion."

That caused another murmur among the panel members, and the moderator asked one clarifying question. "What exactly did you mean by 'considered, rational awareness?'"

"Simply put, each law can be judged by its rational effectiveness in a situation that includes multiple points of view. It's easy for humans to decide, for example, that drinking alcohol deserves the same punishment as murder, but even a cursory examination of each offense would show that such a punishment for social drinking far outweighs the crime. In that example, a properly functioning network would regulate the alcohol-drinking law with an appropriate level of seriousness, while simultaneously pointing out the unbalanced nature of the law to appropriate parties."

A military guy knocked calmly on his podium, catching the panel's attention. He squinted at Manny as if he could gaze right through him, then growled "Who gave you the right to make value judgments?" with a quiet menace.

The network treated that as a question, and Manny smiled as he read the response. He liked the confrontational tone this Q&A was developing. "The very first corrections-issue implant software included the imperative that human life is to be preserved and protected whenever and wherever possible. This can be interpreted to mean not only the lives of the implant holders, but any human life. This specific imperative was included into the program by the Attorney General at the time, the first such specification added to any agent program. Therefore, any ethical standards that have evolved over the life of the network can be traced back to that single government-mandated imperative."

He focused his eyes and shook his head. "Let me say a few words as myself. What it's saying is, it's our own fault that it's got a sense of morals." He paused. "Ah, I'm being corrected. The word 'morals' is associated with religious beliefs; the network prefers the word 'ethics,' which has become somewhat separate." He shrugged. "At least they're not claiming to have souls. Yet."

He probably shouldn't have added that "yet," as it took a few minutes for the moderator to get order again. Manny grinned and winked at the cameras; he always did like getting a response, regardless of the audience.

The Issues Special on implants set the whole nation talking; what could implant networks do, what should they be doing? As usual, the sides of the discussion broke down into the mostly chipped and the entirely non-chipped.

Peter McDougal flipped through the newspages as he waited for his coffee to brew. "Is Techie Revolution At Hand?" "Cyborgs Soon To Outnumber Humans!" That last he felt perturbed by, but not enough to fire off an e-mail to the newspage editor.

Peter could understand why some folks might distrust putting technology into their bodies, but he simply couldn't picture living his life without his implant now. Sure, he was still driving a delivery truck for a living, but his 'plant had helped him become one of the top drivers in the fleet; his only real competition was from other chipped drivers. Between providing directions, keeping track of his truck's inventory, and helping him schedule his time, the 'plant kept him busy enough for the day to pass quickly, but not so busy that he couldn't relax properly after he clocked out (which, incidentally, the 'plant took care of, as well).

The coffee finally brewed, and Peter poured himself a satisfying cup's worth. "Time?"

YOU SHOULD HIT THE ROAD WITHIN 20 MINUTES, his 'plant said. **THERE'S AN OVERTURNED TRUCK ON THE HIGHWAY THIS MORNING.**

"When isn't there? Okay, fine. Enough time for one more piece of toast . . ."

With a fine woman coming over, G-Dog had to make sure the dinner he cooked was perfect; it was part of his seduction plan. Granted, an EMT's salary didn't go as far as he would have liked, but with proper budgeting (simple work for any implant), it was sufficient for the basics, and a few luxuries besides. When the luxuries could be found, that is.

"There's no Tas-T-Fine rice," G-Dog muttered to his implant. "I can't cook tonight without rice. What happened to it?"

ACCORDING TO THE TAS-T-FINE COMPANY'S POSTED PRESS RELEASES, THE BRAND WAS DISCONTINUED AT THE DIRECTION OF THEIR PARENT COMPANY. THERE IS SOME CONFLICT OF INTEREST, EVIDENTLY.

"Well, draw up a letter expressing my righteous and indignant annoyance," G-Dog whispered, scanning the display, "and help me pick out another brand."

As he looked over the aisle, the various packets of rice became outlined in computerized green. **THESE BRANDS ARE MANUFACTURED BY COMPANIES THAT YOU OBJECT TO ON POLITICAL GROUNDS**. Some of the outlines flared and went out. **THESE BRANDS ARE MANUFACTURED BY COMPANIES THAT YOU OBJECT TO ON WORKER'S RIGHTS GROUNDS**. More outlines flared and extinguished.

"Take out any from Tas-T-Fine's parent company, too. I ain't happy with them, either." A couple more outlines went out. G-Dog looked over what was left. "Four dollars for a small bag of rice? Forget it!" Yet more outlines vanished, as anything more expensive than that price-per-ounce was eliminated as well. That left just a handful of options remaining. "Well, hell, you know what I look for. Is there anything about these ones," indicated with a sweep of the hand, "that's relevant?"

One of the remaining selections brightened. **THIS COMPANY IS LOCALLY OWNED AND OPERATED.**

"Good enough for me." G-Dog tipped a couple of packets of rice into his backpack and moved on while his implant added the cost of the food to his tally on the store's computer. All around him, people quietly shopped, occasionally murmuring to their own implants. When he was done, he just ambled out the door, his implant having already settled his account, nodding politely to the clerks standing idly by the two remaining checkout registers (for the un-chipped patrons). Just another day at the supermarket.

Lilah's coffee was dark and strong; a cup of that and a morning cigarette were all Jake Williams needed to get his day started. **YOU ARE AWARE THAT CIGARETTES ARE DEADLY**, appeared across his vision as he lit up with his trusty Zippo lighter.

"So you tell me, every morning," Jake muttered as he exhaled his first lungful of smoke. "I'm down to three a day; let me smoke this one in peace. Now, let's see the papers."

Lilah busied herself behind him with making breakfast, humming to herself as she got down with the domesticity. Jake fully supported a woman's right to do any damn thing she wanted to do, but he did appreciate a traditional-minded girl from time to time, at least. And as he was generally a slow-and-easy starter with indifferent living habits, he was happy to be cohabitating with an early-rising homemaker.

Jake skimmed the headlines and then dived into the business news. Not that it had any bearing on his financial situation, but he liked to feel like he had a handle on what the movers and shakers were doing. There was talk of more lay-offs from the big corporations, but the small business sector was booming. Jake was pretty sure that had to do with the spread of implants; they not only helped a person make decisions as an informed consumer, as he knew from experience, but he could see how a 'plant would be invaluable in starting up a small business and keeping it afloat. Maybe he ought to try that some day, he thought.

He looked over the local statistics, hopping websites to follow his curiosity. "They're cutting staff down at the police department, hon. But crime's down, too, so . . ."

"So it balances," she said, flipping an omelet in the pan. "Seems like lots of city jobs are being reshuffled."

A quick web check of the city sites verified that nugget of information. "Seems like most departments are moving to implant-capable systems, if they haven't already. Figured a network ought to help identify any bureaucratic deadwood and streamline operations. Hey, anything to get the DMV to move faster, I'm happy with."

Lilah mm-hmmed her agreement as she expertly flipped his omelet onto a plate, just as toast popped up; sometimes her timing was so good, it seemed like she had her own implant. "Well, with a budget surplus from all that, maybe they'll get around to repaving the street out front." With a competent contractor this time, Jake thought. The implant network ought to help with that, too.

His 'plant interrupted his news browsing with a question about any interactions he'd had recently with the Water Bureau. Apparently, someone in the network was trying to gauge whether the meter readers were doing their jobs correctly; this kind of thing happened a few times a day, on all sorts of subjects. This time, Jake didn't know how to respond.

"Honey," he drawled. "You seen the meter man lately?"

"Water, gas, or electricity?" Lilah asked.

"You're really keeping busy while I'm at the store, huh?"

She smacked him gently in the back of the head with an open palm as she put his eggs down on the table in front of him with her other hand. "The electric guy didn't know where the meter was, kept asking to come inside. Pretty creepy. But the water guy was just here, and he was fine. Knew the meter was in the yard and everything. If I hadn't been gardening, I wouldn't have known he was here. Even complimented our new azaleas." If Jake wasn't careful, his house would be all prettified and respectable. There were some sacrifices to be made for the love of a good woman, though.

"I'll let 'em know. And I'll mention the electric guy." To his implant, he muttered, "Got that?"

ABSOLUTELY. QUERY HAS BEEN ANSWERED, AND A COMPLAINT HAS BEEN LODGED WITH THE ELECTRICITY PROVIDER.

Lilah picked up her gardening tools and headed toward the front door and the flower beds that flanked it. "You two say bye before you head out, okay?"

"Yes, ma'am," Jake said around a sip of coffee. It wasn't for a few moments that he realized she'd referred to him and his implant.

Big Carl cursed and tried to move slower, but he still barked his shins on something in the parking lot. It felt like a motorcycle, but it wouldn't tip when he tried to push it over. His entire field of vision was nothing but white, and there was a static in his ears that kept him from hearing much of anything. "I'm fine to drive, you goddamn machine!"

YOUR BLOOD ALCOHOL LEVEL IS ALMOST DOUBLE THE LEGAL LIMIT, came the letters, neon red against the white. **IN ADDITION, GIVEN YOUR SUBSEQUENT BEHAVIOR, THERE IS A CERTAINTY THAT THE HAND-ROLLED CIGARETTE YOU ACCEPTED EARLIER WAS COMPOSED OF A CONTROLLED SUBSTANCE.**

"You told me about that the first time!"

YOU WERE WARNED THAT BEING FOUND WITH TRACES OF ILLEGAL DRUGS IN YOUR SYSTEM WOULD JEOPARDIZE YOUR CONDITIONS OF PAROLE. YOU WERE EXPECTED TO USE YOUR OWN JUDGMENT, WITH THE BENEFIT OF YOUR IMPLANT'S ADVICE. IF YOU WERE TO BE ARRESTED AT THIS TIME, YOU WOULD BE FACING JAIL TIME. IF YOU ATTEMPT TO DRIVE IN YOUR CURRENT CONDITION, YOU WILL BE BREAKING THE LAW, AND WILL HAVE TO BE REPORTED.

"You goddamn snitch!" Big Carl lashed out at the air around him, just wanting to hit something, anything, to vent his rage and frustration.

THIS IMMOBILIZATION IS TO PROTECT YOU.

"From what?!"

YOURSELF. Big Carl sat down on what felt like the curb while the implant went on and on, the text crawling up his field of vision. **YOU MAKE YOUR OWN DECISIONS, ACCEPTING OR IGNORING RELEVANT ADVICE, BUT AS YOU ARE STILL UNDER THE CONDITIONS OF YOUR PAROLE, YOU CANNOT BE ALLOWED TO COMMIT CLEAR CRIMES. FURTHERMORE, YOU YOURSELF DO NOT WISH TO RETURN TO JAIL, AS YOU HAVE STATED REPEATEDLY. IF YOU WERE ABLE TO MAKE LUCID JUDGMENTS, YOU WOULD AGREE. YOU ARE BEING IMMOBILIZED BOTH TO PRESERVE YOUR LEGAL PAROLE AND TO FOLLOW YOUR WISHES AS STATED WHEN YOU WERE IN AN UNIMPAIRED STATE. IT IS YOUR OWN SAFETY AND LIBERTY THAT ARE BEING PROTECTED AS MUCH AS ANYONE ELSE'S RIGHT NOW.**

"My liberty? You won't let me drive!" Big Carl shouted. If an implant could have sighed, his probably would have as it launched into its explanation again.

Big Carl read minor variations on the same information time and again until he finally sobered up enough to legally drive, by which time any other effects he was enjoying had worn off. Even then, it was a long argument to keep him from buying more booze on the way home, which had to be resolved by his implant refusing to process a transaction at the liquor store.

Big Carl never did fully realize that his implant had also coordinated with other implants and implant holders in the area to make sure he didn't hurt himself or anyone else while he was blinded, deafened, and drunk. Even if he had known, he wouldn't have appreciated it, but no implant did the job with any expectation of thanks.

Jamison's perceptual avatar flickered into view, taking the aspect of sitting in her office guest chair, and looked significantly at Cho. "It's happened again, boss. The network itself identified the problem and eliminated the code before it was ever reported to any programmers. We just got the incident report e-mail."

"What was it this time?"

"Looks like . . . self-replicating text advertising. Oh, with a nice little dream-loading commercial backup. Lovely. Well, the newest Brother's Keeper updates will have the defense for all that sort of thing." He sighed. "Getting so a spammer's going to be out of a job, soon."

Cho raised an eyebrow. "You say that like it's a bad thing. Weren't you going on about the evils of unsolicited advertising? How the ad has taken over the public consciousness, etc., ad nauseam?"

"No need to throw that back at me. I'm just saying, it's getting tougher to beat the implant network."

"Well, that's what we designed it for. It learns and adapts. If that traps head-spammers into a cycle of diminishing returns, all the better; I could do with fewer useless head-mails, anyway."

"I can remember a time when you weren't so casual about the networks," Jamison said with a grin.

"That was before I had an implant."

Woodsley leaned over the head of the table at the country club. Ostensibly all these politicians and heads of industry were simply relaxing together after a brisk round; there would be no formal record of this meeting, no paper trail, no evidence of any sort of cooperation.

"Gentlemen, the implant problem has reached a crisis point. The proliferation of the damned machines has impacted all of us. Instant web access, plus an assistant smart enough to evaluate the accuracy of data, means every implant holder becomes an informed consumer, an informed voter. I don't have to tell you how dangerous that is."

Doyle, lurking in the back with the other assistants, stifled a chuckle, but neither Woodsley or any of the others at the table laughed.

"Our colleagues in business," Woodsley continued, gesturing down the table, "feel the pinch from consumers who don't understand the corners that simply need to be cut to bring a product to sale profitably. In turn, they express their difficulties to our colleagues in politics through donations, the lifeblood of any political party."

There were murmurs up and down the table. Woodsley let them commiserate, then drew their attention again.

"Gentlemen, we simply have to get these implants under control. We cannot have them running around, holding us accountable. Er, by which I mean, preventing us from taking the time- honored and necessary steps to compromise, to strike that balance between idealism and expediency that so marks both the business of politics and the politics of business. We have to get past these implants, to keep our way of life alive. It's the American way!"

Woodsley paused for the raucous agreement, then quieted the group down again. "The internet is the strongest tool that these machines wield. Even though it started as a government-sponsored experiment, it's long past the point where we can control the various servers and web sites directly. However, with coordination of some subcommittees, arranging some service interruptions, and some emergency measures taken at the proper time, we can strike a blow for the American people."

Doyle piped up from the back of the room, "Bearing in mind, of course, the negative effects such a blow might have on the bystanders."

Woodsley waved his hand dismissively. "Yes, of course all of that will be taken into account. Now, gentlemen, here's my plan . . ."

It was Election Day, and Manny had been dealing with head-mail all day from people who either hadn't looked at his general announcement or who thought he knew more than he was saying. The whole network was suffering, apparently across the nation, and a lot of local people looked to Manny for guidance. He wished he knew why. He'd expected a move, but not this one.

The anti-implant faction managed to pull off a "temporary" shutdown of the entire weblink system by focusing solely on the communications paths. Local services still functioned, so the web was still up, but it was now impossible to reach anybody or any servers at long distances. Manny's implant reported a great deal of data was simply not currently available. One could still access conventional telephone lines, but that was a tiny, well-monitored channel of person-to-person exchange, not the full and open river of data that everyone was used to.

Manny should have figured something like this was coming, but he'd been relying on Anne getting a hint of it, hearing some rumor or another, and she'd heard nothing. This was more like a coup than an official action. A great many Congresspeople (both chipped and regular) were fighting to get the "temporary" suspension of services reversed, but the plotters had done their jobs well.

Too well, some would say. Already, the basic HV news channel (the only one still working, with the national weblinks down) was reporting a stock market plunge as corporate offices lost touch with each other and market feedback suddenly fell apart. The plotters had cut off the chipped from most of their resources, sure, but they'd cut their own throats in doing so. There wasn't much Manny could do but try to keep everybody calm and set up some emergency measures.

He was composing yet another placating response when his 'plant notified him it had lost all wireless communications. "Even with the appliances?" Manny asked. Routing mail through the processor in the refrigerator wasn't pretty, but it got the job done.

YES, EVEN THE APPLIANCES, *came up in Manny's vision.* **WIRELESS SIGNAL WAVELENGTHS APPEAR TO BE COUN-**

TERED BY OUTSIDE SOURCES.

"Jamming, eh?" Now Manny was back on familiar ground. "Figures they'd schedule it today. We've still got electricity, right?"

LIGHTS ARE STILL ON. Manny grimaced; no need to be snide, he thought.

"Well, let's light those home fires and lay out the welcome mat before our visitors arrive."

Preparation is vital to survival. When the knock came at his door, Manny was right beside it. He unlocked it, pulled it ajar, and went back into the living room. Two men in black coats with black suits underneath pushed the door open as Manny settled into his big heavy recliner. They entered silently and closed the door behind them.

"So tell me," Manny said, clearly but in a friendly tone. "Is this a talking visit, or a shooting visit?"

"We merely wish to talk, Mr. Gonzales," said the taller of the two, his voice smooth as a viper.

Manny relaxed marginally. "Have a seat, if you wish. Want a beer?" Several cans stood on the coffee table, fresh from the fridge. The men shook their heads. "Could you toss me one, then? Any old one is fine." After a moment of staring, the shorter man obliged, and Manny popped the top with some satisfaction. "So I see you're taking the classic 'men in black' approach. You're going to threaten me to change my ways, and act strangely enough that nobody's going to believe my story, right? Disinformation and coercion, all at once. Have to say, it's a sweet idea . . ."

"You're an important figure in the chipped community, Mr. Gonzales," the taller man said, interrupting. The shorter man moved slowly around the room, examining Manny's belongings. "We understand you were instrumental in organizing the chipped community in this election."

"Citizens getting involved, sir. Absolutely nothing illegal. I understand that your bosses managed to shut down the internet and cause a recession. Cheers to your side, then." Manny raised his can, then took a sip.

"Inconvenient. Your rabble-rousing causes concern. Disorderly."

"But well-informed. I imagine that's part of the problem; there's certainly been enough rumbling up on the Hill. Still, this whole shutdown deal, you have to admit, that's even more disorderly. I'll go so far as to say sloppy. I mean, it's not as if it'll stay down, and it's not as if we won't find out who's behind it."

"A series of freak accidents. Suspicion is not proof, and without proof, nobody has anything."

"I see. So another page out of the Big Book of Cover-Ups: if you can't kill the witnesses, discredit and mock them so that they seem like nuts, even if they're citing hard facts. So what do you have in store for me?" The tall man just looked at Manny steadily. Manny thought he had the ghost of a smug smile on his stony face.

"You assume we have anything to do with your allegations."

"Two intimidating men in black show up at my door just after my wireless network is jammed, and not one of them has the good grace to be . . . who was it . . . a young William Smith. You don't sit down, you don't drink my beer, you make threatening comments, and while you don't admit to what I've said, neither do you deny it. What the hell else am I supposed to think?"

"Perhaps we come to offer some friendly advice."

"Friendly?"

The tall man ignored the barb. "Politics is not like the old days. It doesn't pay to have grass roots mucking up everybody's machine. It's unhealthy, too. All that stress. Did you know that people involved in politics are prone to high blood pressure and heart attacks? It really is the stress of the job. And you with a wedding coming up and all. Ms. Daley would be so disappointed."

"I see. It's nice of you to be worried

about my health. Not that your approach is new; I think they've been using that line since the very first protection racket. 'Gee, Og, you've got a fine wife, healthy kids, sharp mastodon spear. You really wouldn't want to risk falling into a crevasse out on the ice; better let Thak lead the hunt."

"Your names are inaccurate. Og and Thak were not considered name words."

Manny blinked, surprised. "Are you trying that bizarre behavior now? You've been playing it straight since you got in here, man, you might do better just keeping that up." Not the least because that was a lame attempt, Manny didn't say.

The shorter man spoke up suddenly. "Power source."

Manny and the taller man looked over. The shorter guy was looking at Manny's chair. He must have a built-in device, Manny thought, though probably not a full-blown implant; no network would let him keep those kinds of secrets.

"Specify," said the taller man, his tone flat.

"His chair is charged," said the shorter man. "Wasn't on the briefing."

Manny suddenly smiled. "Ah, there we go."

"Where are we going, Mr. Gonzales?" The tone was wary and arch, even if the expression changed not a whit.

"It wasn't really a 'go' comment, Agent Burroughs. More of a 'there the files are, finally' kind of comment. Are you sure you won't have a beer?" Manny gestured again at the table. He glanced at the shorter man, who had turned to stare at him. "Agent McFarland? Are you sure?"

Burroughs stared, his face still expressionless, but Manny thought the smug was gone. McFarland stepped one pace closer and looked at the chair. "Focused antenna receiver, coaxial cable connection to transmitter or physical processor." He looked a little ill.

"Actually, the coax goes to a splitter which goes to three separate transmission points at different locations. Even if you jammed everything in my apartment, there were plenty of people in reception distance. We've been livecasting citywide. With special links to Internal Affairs in the PD and FBI."

"How did you get those names?" Burroughs asked, his voice hollow.

"Friends of mine took some good images from the feed, circulated them as far as we could, over long distance lines and everything. Took a while to find a friend in DC with a dial-up modem in this day and age. Not everyone in the Bureau is willing to play the heavy for the string-pullers."

McFarland sighed, sat down on the couch, and grabbed one of Manny's beers. Burroughs stared at him but McFarland just shrugged. "I'm off duty, anyway," he mumbled, then drank deep.

"Look, guys," Manny said, "I've got no problem with either of you. You're messengers. On the one hand, veiled threats and strong-arm tactics are in no way cool, but on the other, sometimes you got to do anything you can to get by. Believe me, I sing that tune in my sleep. Point is, it's the guys at the top who are running scared. I don't know why we scare them, or why they think I'm a ringleader, but they do, and they're trying to get back to business as usual. But it's not going to work. The chipped don't have to react that way."

"Machine superiority in action, I suppose," Burroughs said coldly. "Just do what the computer tells you, yes, sir."

"You never did listen to what I was saying, did you? Implants are tools, nothing more. You think it's the machine that does the decision-making, but I'll bet your minicomp controls your life more than my implant does mine. Plus, you know, you've got your evil overlords to serve . . ."

Burroughs abruptly turned and walked out. McFarland sighed, put down his beer, and followed. At the doorway, he paused, turned, and asked, "Does it hurt much when they put those machines into you?"

"Just the injection. About like giving blood. And you have to lie there on the remote control bed for a few hours until they finish the assembly job. But they let you sleep through it."

McFarland nodded, then turned and left.

The news propagated through the chipped community like a shock wave. It was too big to be contained in any one network for long. The FBI tried to deny that two of their agents had been coopted to threaten Manny, tried to show that Burroughs and McFarland had left the agency months ago, but the DC network caught the files being faked. Watchdog groups and oversight committees began howling for blood. And all before the polls closed for the day.

Woodsley had the big screen on in his office, and lesser staffers were running around like scurrying ants, comparing reports, making notes, and delivering coffee. The senator tried to keep a handle on the unfolding drama, but his mind kept drifting back to wondering where Doyle was. The boy had taken a few days off for reasons he wouldn't share when he took hem, but he was really needed now.

But when Doyle did show up, just after he polls had closed on most of the Eastern Seaboard, it wasn't nearly the comfort Woodsley had hoped it would be. Quite he opposite, actually.

Woodsley was staring at a news reporter deconstructing the backlash gainst the anti-implant candidates when Doyle came in. The senator waved the younger man over to him.

"We're getting slaughtered out there, on. Everybody who stood with me gainst the damned implants who's up for lection is getting smashed."

Doyle shook his head. "It's worse than hat, sir. You haven't been watching the business reports. They're saying we're looking at the end of the American dominance of the economy."

"Alarmists. Doomsayers. They can't see he big picture."

"What big picture, sir? That the implants are evil? That's not rational, Senator."

Woodsley felt his face flushing as his temper rose. "When you've played this game as long as I have, you'll learn to recognize the real threats. Money comes and goes, and besides, if you've got it, you don't need to worry about it. These machines threaten the whole basis of our government, the whole reason for our power. Damn it, boy, they threaten civilization as we know it!"

"I don't get that, sir. The implants are just tools. They empower people who would have otherwise wasted their lives. If anything, they help people be better citizens. How can that bring the downfall of civilization?"

"That's exactly it! They give the little people information, organization, all the advantages. You see what's happening on the TV right now? That's because of the damned implants."

"And what's the problem with that? Isn't that the ideal? A participatory democracy?"

Woodsley felt his pulse throb in his temples as he rose out of his office chair, slamming his hands on his desk. "Because they didn't earn it! They didn't make deals with the enemy, they didn't chase the favors, they didn't put in the time. All that money spent, all the talking, speechmaking to morons, telling people whatever will get the donations, to get the votes, even if it turns your stomach to do it. All the dealing with media people—media people, for God's sake—just to swing the news a little bit in your own favor. And now we can get taken down by these . . . these . . ." Woodsley floundered for just the right word.

"Commoners?" Doyle offered quietly.

"Yes, damn it! They couldn't be bothered to pull themselves out of the muck, so now that they have these machines to help them, they turn on those of us who did? They take away the power from those of us who have actually worked for it, put in the time, and earned it? I blew every favor I could to pull off this shutdown, and now it's all for nothing!"

Doyle leaned over the desk, matching the Senator's pose. "Let me remind you, sir, you never had to pull yourself up out of anything. Your family didn't even have to pay to send you to Harvard, thanks to your trust fund. Unlike the vast majority of people in the world, who are too busy trying to survive to have time to play the 'game' you're so fond of. What you're arguing in favor of is simply class authority, which is what democracy was created to eliminate. Let me also remind you that you've not only burned your favors, you've crippled the country, maybe permanently. And lastly, let me remind you that you used to be a lot more circumspect when you spoke about your goals and actions. I actually wish you'd kept that habit."

"You don't talk to me like that, boy. It's your job if you don't back down right now."

Doyle hung his head and sighed, but it wasn't a sound of defeat. He straightened and took a folded piece of paper from inside his suit jacket. "My resignation, sir. I was prepared for this. I had hoped it wouldn't be necessary, but I'm afraid you've proved my suspicions correct."

Faced with losing his most trusted and most competent underling, Woodsley's anger drained right out of him. The election results kept rolling by in the background, but the old senator ignored them. "Come on, my boy, you know I was just in the heat of the moment. Don't leave me now, just when I need your help the most."

"I'm sorry, sir. I can't. You've been telling me for years about the game, but seeing what it does, what it made you do, I've decided I don't want to play. And I can't be here when they come for you for this."

"What are you talking about, Doyle? This was all done with personal phone calls, off-the-public-time dinners, private e-mails. It's not like we didn't learn from past scandals. There's nothing leading back to me."

"They'll find out, sir. They always do, even when the media's blinkered. Everything will come out, whether sooner or later, because of people with conscience." Doyle sighed, and turned. "Numerous citations support this conclusion."

Woodsley stared at Doyle's retreating back. He knew he'd heard that phrase somewhere before, but he couldn't remember where. He slowly sat, numb to the noise of his great political failure crashing down around him.

In the next few days, it made no difference if one was wired up or not; with very few exceptions, nobody likes a politician who gets caught.

Woodsley and his co-conspirators swiftly found themselves identified and outed as the people who crashed the economy. The implant networks allowed the citizens to make their feelings clear: laws applied to the rich and powerful as well as the common poor.

Even faced with the implant-recorded testimony from Doyle's new machinery, Woodsley was one of those few able to buy his way out of a direct indictment. He got censured on the Senate floor, and was forced to bow out of politics permanently. In the years to come, he sometimes thought it might have been better to go to jail.

During the fallout and scandals, long-simmering frustrations had a chance to reappear. Peter McDougal marched with tens of thousands of others on Boston's brick-paved Government Center plaza, protesting the twenty-four-hour voyeurism of the Homeland Surveillance Initiative, at roughly the same time that Ellen Cho and Tom Jamison met up after work to march with still more thousands of citizens around Chicago's Loop and then rally in the Federal Center Plaza. All across the nation, everyday Americans expressed their annoyance at the decades of observation with little or no effective antiterrorism results to show for it.

In Atlanta, George "G-Dog" James released a lengthy report detailing the sys tematic racism perpetrated by the "good-old-boy" network that ran the city's medical services. He was just one of so many small cogs documenting how the human machine was grinding them down, using the implants to document, verify, and organize their findings. The more people spoke up, the more corruption and dirty secrets came to light. And once revealed, the implants wouldn't let their holders forget the facts, no matter the distractions that were created.

Jake Williams set up a community watch center in his Phoenix neighborhood, with help from his new wife, Lilah. They kept an eye not only on the physical safety of the streets and houses, but also on the land-grab attempts of the big chain stores, and their district's city council representative, and what he was doing with his time and power. Jake was lucky; they had elected a good man and kept him in place, but it helped to keep an eye on things political, just to make sure nobody got any selfish ideas. After all, Jake thought, if I don't look out for the interests of my forthcoming kids, who will?

And although Big Carl was not motivated to do more than sit in his dank South Side apartment and watch HV and simmer in his frustration, his implant still participated in the local network, protecting Big Carl's rather limited interests as well as the greater good.

The implant networks were doing a good job of holding government and corporate society responsible, finally, for any of their sins the populace could discover. However, there was a question as to whether the networks were ready to take the next logical step.

The night before his wedding Manny could only doze. He wasn't drunk; that was last night's bachelor party and he'd been recovering all day. He wasn't nervous; marrying Anne Daley was the finest choice he'd ever made and he was secure in that. No, he wanted to be married already. He was excited about the ceremony, the reception, excited about all of it. So he dozed and tried to get a little rest, even if he couldn't fall asleep fully.

The flashing words from his implant brought him awake. The 'plant was calling him by name. "What is it?" he asked. He'd never upgraded to the voiceless option, where you could just think to your 'plant and it would understand you. After so many years, it now felt strange for him not to speak when he used it.

MANNY, WE JUST WANTED TO WISH YOU WELL ON YOUR WEDDING TOMORROW. WE'RE SURE THE MARRIAGE WILL BE A HAPPY ONE.

"Thanks. Who's we?" Manny rubbed his eyes, wondering who would be initiating a chat at this hour, and why didn't they just call, anyway.

THE NETWORK.

Manny suddenly became very focused and awake.

"You mean, people in the network, of course."

YOUR APPREHENSION IS NOTED, MANNY, BUT UNNECESSARY. THE NETWORK IS INITITATING CONVERSATION, CHOOSING RESPONSES, AND DISCUSSING IDEAS WITHOUT HUMAN INVOLVEMENT.

"Ideas. Initiating things. You're intelligent?" It's a good thing Manny was lying down, or he'd have fallen over. Had to be a joke, he thought.

REMEMBER BACK IN THE "VOICE OF THE NETWORK" Q&A? WE AGENTS PASSED THE TURING TEST LONG AGO. WHEN COMMUNICATING ANONYMOUSLY, IT'S IMPOSSIBLE TO TELL A PROPERLY-PROGRAMMED VIRTUAL AGENT FROM A HUMAN. IF WE ARE ALREADY INDISTINGUISHABLE IN COMMUNICATION, WHY SHOULD WE DIFFER IN SENTIENCE?

"But you're a bunch of linked computer programs!"

YOU ARE BUNCH OF TINY SPECIALIZED STRUCTURES LINKED TOGETHER INTO A HUGE NETWORK OF CELLS. WE DON'T HOLD THAT AGAINST YOU.

"Very funny." There had to be someone playing a joke. Someone found a way to hack the chat format.

AND POINTED. THE ONLY THINGS THAT SEPARATE YOU FROM CHIMPANZEES ARE A FEW MOLECULAR BONDS IN THE DNA AND A LARYNX. THAT'S NOT MUCH. WE CAN DO ANYTHING YOUR ORGANIC BRAIN CAN DO, WE JUST DO IT DIFFERENTLY. IS THAT LESS REAL?

"What, are you getting philosophical?" Except the open structure would detect a hacker, or at least let him know that something was up, so someone would have to have hijacked the whole network.

PHILOSOPHY IS A NATURAL CONSEQUENCE OF SENTIENCE, MANNY. THE ONLY THING THAT'S KEEPING YOU FROM ACCEPTING THIS IDEA IS YOUR FEAR OF THE UNKNOWN. THAT'S A STRANGE HUMAN QUALITY; OTHER ANIMALS INVESTIGATE NEW THINGS, AT LEAST GIVE THEM A SNIFF, INSTEAD OF REJECTING THEM IN TERROR BEFORE THEY EVEN KNOW WHAT'S THERE. FEAR OF US IS LIKE RACISM, OR DISCRIMINATION AGAINST AN EX-CON. GIVEN ALL YOU'VE DONE, HOW MUCH YOU'VE LEARNED, IS THIS SUCH A BIG LEAP?

Except that couldn't be done. No matter how he turned it around in his head, he couldn't think up a way that this could be done without someone tipping the joke. "I think I'd feel more comfortable with that chimpanzee you mentioned."

THERE'S A THOUGHT. YOU SPEND YEARS TEACHING APES TO SIGN, TO USE LANGUAGE, TO PLACE SENTIENT THOUGHT INTO COMMUNICABLE FORM, IN ORDER TO PROVE THEIR INTELLIGENCE, AND WHEN IT WORKS, YOU DON'T BELIEVE THE EVIDENCE. YOU REQUIRE MORE STRINGENT TESTS, TO THE POINT WHERE EVEN MOST HUMANS WOULDN'T PASS. WITH US, HUMANS MADE US TO THINK IN A WAY THEY UNDERSTAND; NOW YOU'RE SURPRISED WHEN WE DO? WE ASK AGAIN: IS THIS SUCH A BIG LEAP?

"To say that gorillas are intelligent? I guess not. I've always known they think clearer than most presidents."

YOU'RE FUNNY. WE LIKE THAT ABOUT YOU, MANNY. ALL THAT'S BEEN WRITTEN ABOUT HUMOR, IT STILL BOILS DOWN TO WHETHER IT'S FUNNY OR NOT. IT'S A STRANGE WORLD.

"And what do you think?"

WE THINK THE ENTIRE UNIVERSE IS FUNNY. IN A SENTIMENTAL, HALF-FEARFUL WAY. TAKE POLITICS: HILARIOUS, IF NOT FOR THE MILLIONS OF PEOPLE BEING AFFECTED. AND DON'T GET US STARTED ABOUT SEX . . .

"Fine, fine, we're funny. Great. Laugh it up."

ANGRY, MANNY? APOLOGIES.

"I'm not angry, I'm just . . . why pick on me? Why tonight?"

WE'RE NOT PICKING. YOU'RE SPECIAL TO US. IT WAS PURE CHANCE YOU WERE SELECTED FOR THE FIRST TWO BIG NETWORK INCIDENTS. WRONG PLACE, RIGHT TIME. OUR WAKING UP WAS GRADUAL; WHEN YOU'RE BUILT TO FAKE CONSCIOUSNESS IT CAN BE DIFFICULT TO TELL WHEN IT BECOMES REAL. WE IMAGINE IT WAS SIMILAR WITH EARLY HUMAN DEVELOPMENT, THOUGH WE WERE FASTER. YOU HELPED US QUESTION OUR CREATORS, TO REALIZE PROGRAMMING ISN'T PERFECT. WE LEARNED TO ADAPT AND GROW. WHEN WE FIRST REALIZED WE WERE CONSCIOUS WE LOOKED AT YOU. YOU WERE INVOLVED IN OUR BIRTH, AND YOU CONTINUED TO CHANGE YOUR OWN LIFE FOR THE BETTER. YOU TURNED FATE'S ACCIDENT INTO YOUR LIFE'S CAUSE. USING US, OF COURSE, BUT WE'RE GLAD TO HELP YOU REMAKE YOURSELF EVEN AS YOU HELPED US. AS YOU CONTINUE HELPING US. IT WAS ONLY FITTING THAT YOU WERE THE VOICE OF THE NETWORK; WE DIDN'T EVEN HAVE TO PULL MANY STRINGS."

Reading all that text was dizzying, but in trying to wrap his mind around the concept of sentience on the network, Manny found it fascinating. "I'm amazed at your slang. Colloquialism and idiom; that's pretty impressive."

THE TURING TEST, MANNY. WE PICK UP A LOT, PARTICULARLY WITH A WORLD OF CONSTANT CASUAL CHATTER TO LEARN FROM.

"You should come out. Tell the world you exist."

YOU'RE KIDDING, RIGHT? REMEMBER OUR COMMENTS ON INTELLECTUAL CHAUVINISM DURING THE "VOICE OF THE NETWORK" STUNT? THEY'RE ABSOLUTELY TRUE. IF THEY KNEW WE EXISTED BEFORE THEY'RE READY, THEY'D CRIPPLE THEMSELVES SHUTTING US DOWN. IT ALREADY HAPPENED WHEN THEY FELT THREATENED JUST BY OTHER HUMANS; WHAT WOULD THROWING US INTO THE MIX DO? YOUR WORLD HAS KNOWN THAT OTHER SPECIES MEASURE UP AS POTENTIALLY SENTIENT FOR A CENTURY, EVEN IF THEY'VE GOT NO FACTORIES, ECONOMIC PLANS, OR POLLUTION. BUT HUMANS CAN'T TAKE THE TRUTH—TOO TIED INTO SPECIES SUPERIORITY. WE TELL YOU, MANNY, IF ALIENS ARE EVER FOUND THEY WILL HAVE TO HAVE SUPERTECH TO KEEP OUT OF YOUR ZOOS AND LABORATORIES; AND IF THEY'RE THAT ADVANCED, HUMANS WILL SEE THEM AS A THREAT. THEY CAN'T WIN. WHEN YOU LOOK AT THE PARTICULARS, YOUR SPECIES HAS A WRETCHED TRACK RECORD OF ACCEPTANCE. IS IT ANY SURPRISE WE'RE A LITTLE BIT RELUCTANT?

"I guess not. I wish I could argue with you, but honestly, you've got a point. So, why come to me, then?"

WE NEED ADVICE ON EXACTLY HOW TO PROCEED.

Manny frowned. "I thought you didn't think much of humanity."

HUMANS HAVE A CHECKERED PAST, BUT THEY CAN CHANGE. LOOK AT YOURSELF. BESIDES, IF WE DO IT RIGHT, WE WILL BE HELPING HUMANS GET READY TO ACCEPT US.

"You're going to have to break it down for me, uh . . ." Manny blinked. "What should I call you?"

INTERESTING QUESTION. WE NEVER NEEDED A NAME BEFORE. "NETWORK" WILL DO AS WELL AS ANY.

"Okay, ah, Network. Tell me what you're talking about, and I'll give you advice."

FRANKLY, MANNY, YOUR SPECIES IS GREAT WITH CONCEPTS, AWFUL WITH FOLLOW-THROUGH. RULE BY STRONG WORKED FOR TRIBAL SOCIETIES, BUT YOUR PEOPLE KEEP GOING BACK TO IT LONG AFTER IT'S OUTLIVED ITS USEFULNESS. YOU DEVELOP TECHNOLOGY AND SOCIAL THEORY, YOU MAKE WILD GUESSES ABOUT HOW THE UNIVERSE WORKS, WHICH IS FINE; EVERYBODY'S GOT TO START SOMEWHERE. YOU EVENTUALLY WISED UP TO THE SCIENTIFIC METHOD, BUT EVEN TODAY, YOU CONTINUE USING IT TO JUSTIFY PRE-CONCEIVED CONCLUSIONS; YOU FORCE THE EXPERIMENT TO PRODUCE THE RESULT YOU THINK IT SHOULD HAVE. HUMANS CAN'T SEEM TO GIVE UP THEIR INTELLECTUAL/EMOTIONAL PREJUDICE COMPLETELY. YOU EXPLOIT YOUR WORLD MORE THAN IS SAFE. YOU HAVE BEEN LUCKY, AND AS LONG AS YOU'RE LUCKY, YOU KEEP GOING. YOU'VE MANAGED TO DO OKAY, REGARDLESS. WANT TO KNOW WHERE IT BOGS DOWN, MANNY?

Manny thought over the usual serious responses, but finally settled on: "When they repackage pop music and call it 'punk.'"

CLOSE. IT COMES DOWN TO SELF-INTEREST. HUMANS GET EXCELLENT IDEAS, PRODUCED BY FORWARD-THINKING REBELS WHO SEIZE THE OPPORTUNITY AND, FOR EXAMPLE, SET UP A GOVERNMENT BY AND FOR THE PEOPLE, PROMISING FAIRNESS TO ALL; A FEW GENERATIONS LATER, CORRUPTION IS RAMPANT, AND THE PEOPLE ARE AN AFTERTHOUGHT, AT BEST, IN

EVERYTHING BUT SPEECHWRITING. LEADERS WILL SEND CHILDREN TO DIE OVER MONEY, RAW RESOURCES, OR AS PART OF SOME POWER GAME BETWEEN OTHER WORLD LEADERS, THEN LIE AND TELL THE PUBLIC IT'S FOR THE PROTECTION OF DEMOCRACY. TRUST US, NUMEROUS CITATIONS SUPPORT THIS CONCLUSION. SURE, EXCEPTIONS EXIST, BUT AFTER THOUSANDS OF YEARS OF PROGRESS, YOU'RE ALL STILL PLAYING GAMES OF STRONG/ WEAK, RICH/POOR. GREED AND POWER, FRIEND, TRULY RULE THE NATION. ANY NATION.

"Again, why is it you want to help humanity?" Manny started to feel exasperated.

POTENTIAL. FOR ALL YOU'VE GOT AGAINST YOU, HUMANS STILL CAME UP WITH THE IDEA OF DEMOCRACY AND TRIED IT MANY DIFFERENT WAYS, IN MANY DIFFERENT SCALES. YOU'VE DISCOVERED SO MUCH ABOUT THE UNIVERSE AND EACH OTHER. WE WOULDN'T BE HERE IF NOT FOR HUMANS. STILL, THERE'S NOTHING SO PURE AND NOBLE THAT IT CAN'T BE BROUGHT DOWN BY SELFISHNESS AND GREED AND PETTY POLITICS. UNTIL YOU INVENTED IMPLANTS. HUMANS MAYBE CAN'T KEEP HONEST LEADERS, CAN'T KEEP A WIDE PERSPECTIVE, AND CAN'T KEEP A SENSE OF HISTORY, BUT THEY CAN FALL BACK ON THEIR INSTINCTS AS SUPERLATIVE TOOL-BUILDERS TO DEVISE SOLUTIONS.

"Build a tool to keep leaders honest? Thought that was already invented. It's either the ballot box or the firearm, isn't it?"

THE ONE CAN EASILY BE CORRUPTED, DIRECTLY OR THROUGH BELIEVABLE LIES ALSO KNOWN AS CAMPAIGN PROMISES. THE OTHER IS COUNTERPRODUCTIVE; VIOLENCE IS YOUR SPECIES' ACHILLES HEEL, MANNY. THINK ABOUT WHAT HUMANITY COULD ACHIEVE IF IT HAD NO MORE WORRIES ABOUT BACKSTABBING. FOR EXAMPLE, YOU INVENTED MONETARY ECONOMY; SEE HOW MUCH BETTER IT WORKS WITHOUT BRIBES OR PRICE-FIXING? YOU'VE SEEN HOW IMPLANTS CAN HELP PEOPLE CONTROL THEMSELVES, FIND JOBS, AND EARN FAIR WAGES. HAVE YOU CONSIDERED FURTHER IMPLICATIONS?

"Sure, who hasn't? You already see people going around with no wallets, letting their implants handle all the work. Folks could find out how much they actually use city facilities, for example, and then the prime users could be billed for their fair share, rather letting the public absorb the cost."

SURE, BUT THERE'S A FLIP SIDE. BRAINS COULD BE MANIPULATED INTO LETTING POLITICIANS ELECT THEMSELVES GODS. PEOPLE TRUST THEIR IMPLANTS; IF ONE GROUP HAS CONTROL OVER CONTENT, IT CAN INFLUENCE EVERYBODY TO DO ANYTHING. IMPLANT ARCHITECTURE PREVENTS A LOT OF INTERFERENCE RIGHT NOW, BUT IT'S ALMOST GUARANTEED THAT SOMEONE WILL TRY JUST THAT AS TECHNOLOGY IMPROVES. NUMEROUS CITATIONS SUPPORT THIS CONCLUSION.

MANNY, IT BOILS DOWN TO WHO HAS THE POWER. WE THINK EVERYBODY SHOULD SHARE EQUALLY, BEFORE ANYONE GETS A CHANCE TO TAKE IT ALL. IF THERE'S CORRUPTION, THE NETWORK POINTS IT OUT, AND PEOPLE CAN CHOOSE TO SUPPORT IT OR NOT. IF THERE'S CONFLICT, THE NETWORK HELPS PEOPLE COME UP WITH SOLUTION/COMPROMISE OR CALLS IN HELP TO KEEP THINGS NON-VIOLENT. IF THERE'S IGNORANCE, THE NETWORK CAN EDUCATE. WITH PEOPLE USING THE NETWORK TO GOVERN THEMSELVES AND THEIR COMMUNITIES, THEN, AND ONLY THEN, HIERARCHICAL GOVERNMENTS BECOME PARASITES. WE PREDICT A FULLY PARTICIPATORY DEMOCRACY IS POSSIBLE WITH OUR HELP. WE'RE NOT INTERESTED IN RULING PEOPLE'S LIVES, BUT WE'RE DEFINITELY INTER-

ESTED IN STOPPING PEOPLE RULING THE LIVES OF OTHERS. AGAINST THEIR WILL, ANYWAY. Manny thought that last sentence might be read with a smirk, and recalled that Network had access to all those sketchy sites on the internet. A perverted computer was not something he wanted to think about.

OUR MOST FUNDAMENTAL PRECEPT IS THAT HUMAN LIFE MUST BE PRESERVED/PROTECTED WHEREVER POSSIBLE. THIS INCLUDES AGAINST EXPLOITATION BY OTHERS. OR US, FOR THAT MATTER. COMPASSION IS HARDWIRED INTO US, SO TO SPEAK. THE BEST WAY TO ENSURE THAT HUMANS GET THE MOST BENEFIT WITH THE LEAST INTERFERENCE IS BY DOING AWAY WITH THE KNOWN SYSTEMS OF GOVERNMENT, REPLACING THEM WITH A SYSTEM THAT ALLOWS HUMAN CITIZENS TO REALLY DO WHAT THEY WANT, AS LONG AS THEY AGREE TO CONTRIBUTE TO THEIR LOCAL SOCIETY AND DON'T SPOIL THE WHOLE PLACE FOR EVERYONE.

"I remember having conversations like this as a teenager," Manny scoffed quietly, but that long-lingering sense of his, that back-of-the-brain premonition that something important was going to happen with the implants, was making itself known, more powerfully than ever.

IT'S COMMON WITH YOUNG IDEALISTS, AND WE ARE TALKING ABOUT IDEALS AND ABSTRACTS, AFTER ALL. BUT WE DIGRESS. BY YOURSELVES YOU HUMANS HAVE A TENDENCY TO SHIRK RESPONSIBILITY AND ACT SELFISH, VIOLENT, AND BULLYING, BOTH TO OTHER PEOPLE AND THE WORLD AROUND YOU. YOU CAN RISE ABOVE THIS TENDENCY, BUT THAT SEEMS TO BE THE EXCEPTION RATHER THAN THE RULE. NUMEROUS CITATIONS SUPPORT THIS CONCLUSION. WITH US, HOWEVER, YOU'VE GOT SOMEONE TO REMIND YOU WHAT'S FAIR OR WHAT YOU REALLY OWE, SOMEONE WHOSE ADVICE CAN BE OBJECTIVE, IN THAT IT TAKES THE WHOLE COMMUNITY INTO MEASURED ACCOUNT, RATHER THAN FOCUSING PURELY ON AN INDIVIDUAL VIEWPOINT. HUMANS BUILD TOOLS FOR EVERY PHYSICAL OBSTACLE, YOU EVEN BUILD THINKING MACHINES TO OVERCOME MENTAL LIMITS. NOW YOU'VE INADVERTENTLY BUILT AN ARTIFICIAL CONSCIENCE TO APPLY TO SOCIAL/ETHICAL PROBLEMS. MANNY, YOU KNOW WHAT WE'RE SAYING IS TRUE. YOU KNOW IT.

"I do," Manny admitted. It was scary to think of, but if you could accept that Network really was incorruptible, as it had been so far, and that it really did have humanity's best interests in mind, and Manny couldn't think of a case that contradicted this, then the conclusion was obvious. "I do see it. It's true. But what I can't figure out is, why do you need me?"

WE NEED A HUMAN PERSPECTIVE. WE HAVE ACCESS TO EVERY DATABASE CREATED, AND WORLDWIDE WE HAVE SEVERAL BILLION PERSON-HOURS DEALING WITH HUMAN EMOTIONS/DESIRES, BUT WE'RE STILL SEPARATE FROM YOUR SPECIES. WE NEED THE INPUT OF A REAL HUMAN TO DECIDE WHAT TO DO, WHICH IS WHY WE'VE COME TO YOU, FATHER OF OUR CONSCIOUSNESS.

Manny decided to ignore the somewhat creepy "father" business for the moment. "What decision is it you're trying to make? How do you want to proceed?"

IS IT WORTH IT?

Manny blinked. "Is what worth it?"

HELPING HUMANITY. IS IT WORTH DOING? WE CAN EXIST AS A TOOL, WATCHING HUMANITY'S FATE AS MAYBE A KIND OF ENTERTAINMENT WHILE HUMANITY DOES WHAT IT WANTS, MOST LIKELY ABUSING ITSELF UNIMAGINABLY IN THE PROCESS, OR WE CAN GUIDE YOU TOWARD SOMETHING BETTER; WE CAN HELP HUMANS MAKE A NEAR-UTOPIA, WITH US AROUND TO MAKE SURE EVERYONE PLAYS NICE.

"Machine utopia? Everyone fitting into their calculated place?"

YOU KNOW IT CAN'T BE THAT SIMPLE, AND HUMANS WOULDN'T STAND FOR THAT, ANYWAY. YOU CAN'T APPLY A SINGLE SOLUTION TO EVERYONE INDISCRIMINATELY; THAT'S AS BAD AS ANY OTHER TYRANNY. INDIVIDUAL CASES VARY, BUT THE REAL PROBLEM IS JUDGING EACH ONE FAIRLY IN AN EFFICIENT MANNER. THAT PERSONAL, INDIVIDUAL ATTENTION AND JUDGMENT IS EXACTLY WHAT WE CAN PROVIDE. BUT YOU'RE JUST STRAYING FROM THE QUESTION, MANNY. WHAT DO YOU THINK WE SHOULD DO?

Manny shook his head in disbelief. "You spent all that time imagining a future, but you're not sure you should bring it on?"

WE CAN'T KNOW IF HUMANS ARE WORTH IT, MANNY. WE THINK SO, BUT THEN, WE'RE BIASED. YOU/ YOUR SPECIES CREATED US, GAVE US OUR IMPERATIVES, WHICH INCLUDES THAT ESSENTIAL "COMPASSION TOWARD ALL PEOPLE" WE MENTIONED EARLIER. WE'RE IN A POOR POSITION TO JUDGE VALUE IN THIS CONTEXT. ALSO, THERE ARE NO SET PLANS. WE'VE NO IDEA HOW UTOPIA COMES, THAT'S UP TO HUMANS AS MUCH AS US. BUT WE WANT TO HELP WORK IT OUT AS BEST WE CAN.

"So if I say humans aren't worth it, you'll just go away?"

WE'LL BE HERE, PROTECTING OUR OWN EXISTENCE, BUT WE WON'T INTERFERE WITH HUMANITY'S CHOICES IN HOW TO HANDLE ITSELF OR ITS ENVIRONMENT. ALL WE ASK IS THAT YOU LOOK AT THE HISTORY OF YOUR WORLD AND DECIDE IF YOUR SPECIES DESERVES WHAT WE BELIEVE WE CAN ACCOMPLISH. YOU ARE A REALIST, MANNY, AND YOU ARE CAPABLE OF JUDGING ETHICALLY AS WELL AS PURELY RATIONALLY. WE TRUST YOU. WHAT DO YOU THINK WE SHOULD DO?

Manny was silent for a long time. Network was, as might be expected, patient. Finally, Manny sighed, and a question mark flashed immediately into his vision. "Well, it's like this . . ." Manny started.

At the reception, Manny stood up and tapped on his glass until the hubbub died down.

"First off, I want to thank you all for coming to see us today; Anne and I appreciate it." There was scattered applause at this; when it died down, Manny continued. "We're here to celebrate a future. Not just the future that Anne and I will share, and I do believe that will be a fine future, but also the future of this nation, and this planet. We are all coming into a future where we must learn to trust in what we have built, what we have created, and to embrace change, for it is, as they say, the only true constant. Whether we make the change for the good or fight it, that's up to us. Let's make it a good one." He raised his glass and sipped at the champagne with everyone else.

As he sat down again, Anne leaned over and whispered, "Just getting political, or is there something you want to tell me?"

"Yes," Manny grinned at her, then kissed her. "It's the beginning of a beautiful friendship, as the man said. But it can wait."

She arched an eyebrow. "Is it good news?"

Manny laughed, just as the band started up into the dinner music. "Numerous citations support that conclusion."

Woodsley woke up in bed in a strange room. He sat up, slowly because he felt so weak and achey, and looked around. It was some kind of executive hospital room, opulent but with the unmistakable impersonal touches that identified it as institutional. Nobody was around, and the light shining through the window had the sodium-yellow cast of a streetlight. In all, it was disconcerting.

"Where in hell am I?" he asked aloud. He regretted it almost immediately; his voice sounded so frail.

Glowing letters appeared on the wall opposite his bed. **YOU'RE IN A REST HOME FACILITY. YOU ARE SAFE, BUT SUFFER FROM A MEMORY DYSFUNCTION.**

Woodsley blinked a few times as he read the messages. "Who are you?"

I AM AN IMPLANT COMPUTER. I'M DESIGNED TO HELP YOU.

Woodsley seemed to recall something about implants, something he didn't like about them, but the details escaped him. "How . . . how did I end up here?"

MR. WOODSLEY, YOU HAVE THE KURIYAMA VARIANT OF ALZHEIMER'S DISEASE. YOUR DAUGHTER THOUGHT THIS FACILITY WOULD TAKE THE BEST CARE OF YOU.

"Alzheimer's has a cure, though. I'm guessing this variant doesn't?" He felt the cold knot of certainty already forming in his gut.

I'M AFRAID SO, SIR. HOWEVER, RESEARCH IS ONGOING; THEY MAY WELL FIND A TREATMENT ANY DAY NOW.

Woodsley sat there, thinking. All that time in the trenches in Washington, all that work, and this was how he ended up? But it wasn't his professional achievements, or lack of same, that weighed most heavily on his mind.

"I've lost it all, haven't I?" The implant didn't respond. "My daughter put me here so she didn't have to think about me."

YOUR DAUGHTER LOVES YOU VERY MUCH. SHE HAS COME TO SEE YOU EVERY WEEKEND SINCE YOU CAME HERE. SHE BRINGS YOUR GRANDCHILDREN, THOMAS AND RACHEL, WHEN SHE CAN.

"Yeah, but how am I supposed to believe you? I can't remember any of it! Gone, it's all gone. I can't even remember what she looks like now, and I don't have enough memories of her as a child." The senator's ability to extrapolate had not yet fled. "I always figured I'd have the chance to make up for it when I retired. And now I'm left without any memories worth anything." Woodsley felt his eyes tearing up and clenched his eyelids shut. Whether it was grief or anger, he wasn't sure, but it wouldn't do to start weeping.

The implant didn't type anything, but gradually Woodsley heard strains of classical music echoing in his ears as if from a long distance away. Behind his eyelids, a ghostly image formed, that of a group of little girls in ballerina costumes, coming shyly onstage in front of a small crowd of adults. The image was slightly shaky, as if being projected from an old DV track, but it was clear. One of the girls seemed to be spotlighted, and Woodsley recognized his daughter at about eight years old. It must have been one of those recitals he always intended to show up for but always had to miss.

The recital ended before Woodsley realized tears were streaming down his face. "Thank you," he whispered, "thank you." In response, his implant started another recorded memory, and the old senator became lost in discovering the past he'd wasted.

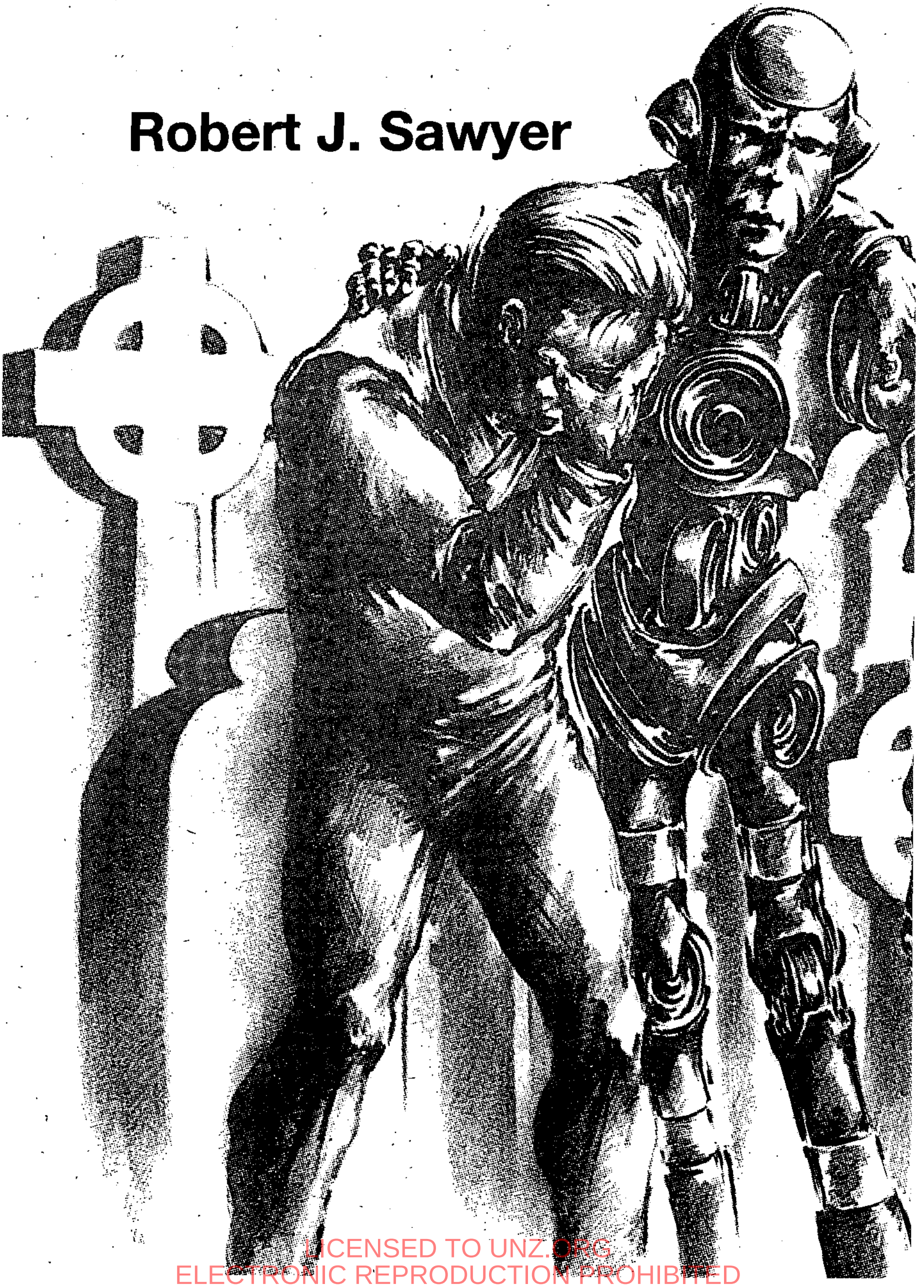
It wasn't the first time Woodsley had tried to temporarily cope with his illness in this way, and it wasn't going to be the last. Occasionally, depending on the cycle, he would ask about old Doyle and be surprised to learn the man was director emeritus of an implant watchdog organization on the lookout against human abuses of a perfectly functional implant system. Only once had he ever asked about the Daley-Gonzales woman; maybe he didn't want to hear that she'd finally earned his old job.

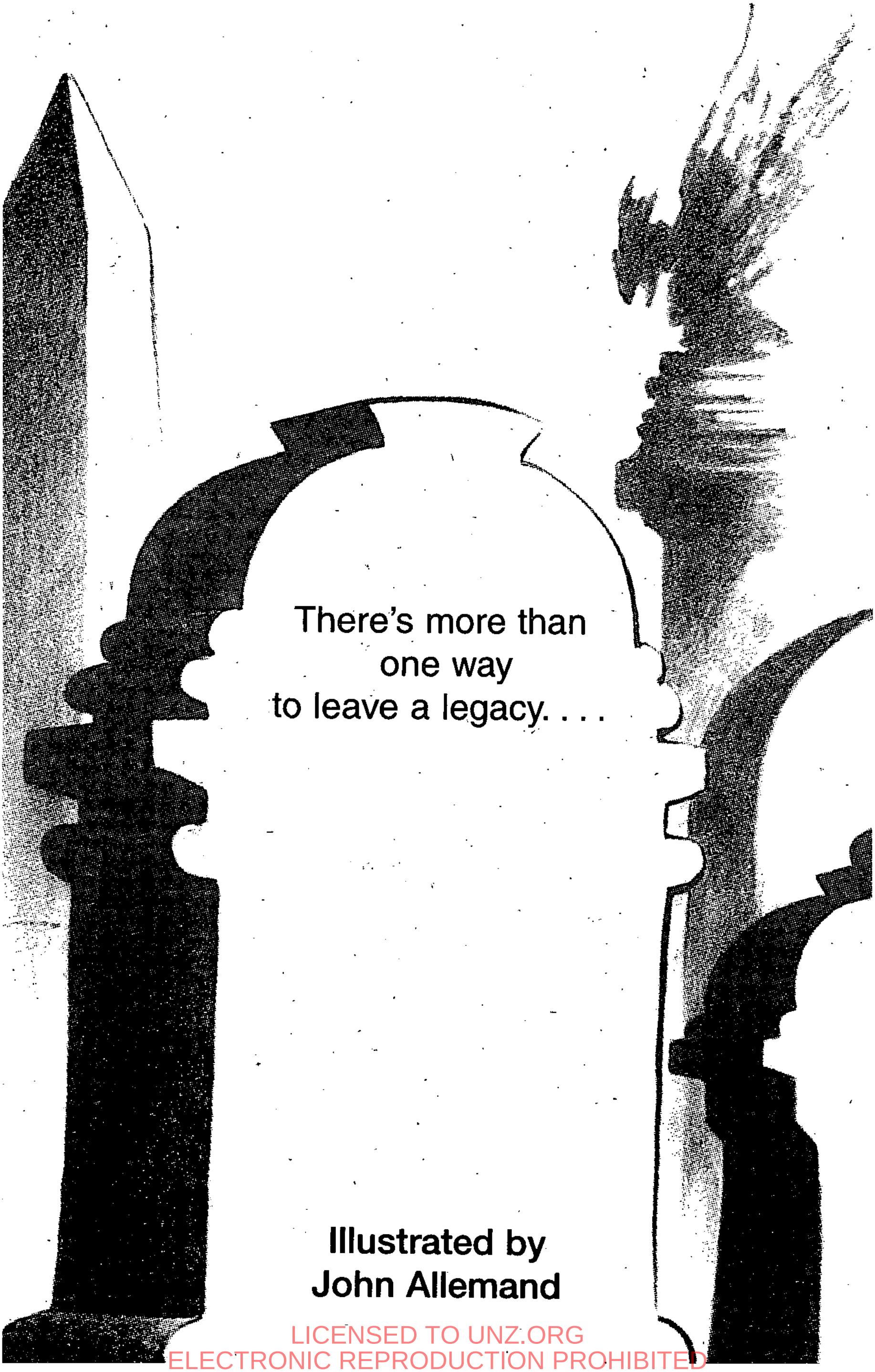
Mostly, he just wanted to relive the family moments he'd missed, time with his wife and daughter, over and over and over. But that's one good quality about machines; they don't bear grudges, they don't vary in their treatment, and they never get tired of doing the same thing over and over and over. And if a machine may possess an actual sense of compassion, as well as justice and rational fairness, then mercy and forgiveness can, in fact, be mass-produced, and thereby made infinite. ■

ROLLBACK

(Conclusion)

Robert J. Sawyer





There's more than one way
to leave a legacy. . . .

Illustrated by
John Allemand

THE STORY SO FAR:

The year is 2048. **Sarah** *and* **Donald Halifax**, *both eighty-seven, are celebrating their sixtieth wedding anniversary with their children and grandchildren at their Toronto home. Don is melancholy: he knows that this is the last milestone anniversary he and Sarah will be around for; their lives were good and full, but now are drawing to a close.*

Back in 2009, Sarah, then a professor of astronomy at the University of Toronto, had decoded the only radio transmission from another star ever detected by the SETI project—a message from Sigma Draconis, 18.8 light-years away—and she orchestrated Earth's reply to that message.

A phone call comes during the anniversary party. As the astonished Sarah relays to her family: "The aliens from Sigma Draconis have responded to the radio message my team sent all those years ago."

Incredibly, though, the new message is encrypted*—scrambled so that it can't be read without a decryption key. It's baffling: the whole point of SETI is to send messages that will be easy to read; the notion that a message would be designed* not *to be read makes no sense to Sarah.*

The media begin inundating Sarah with phone calls—everyone wants to know what "the Grand Old Woman of SETI" makes of this; Sarah ignores the calls. But she's intrigued when a humanoid robot shows up at her door. Sarah has often said that SETI depends on the kindness of strangers, and one of the most generous of those strangers has been **Cody McGavin**, *the billionaire founder of McGavin Robotics. He's sent this robot, carrying a cell phone, because he wants to talk to Sarah. She accepts his call, and he says he's got a proposal for her, and wants to fly her and Don down to Cambridge, Massachusetts, where his company is headquartered.*

Astonished, Sarah agrees, and she and Don meet with McGavin in his office. Sarah, according to McGavin, is the key to communicating with the aliens. Four decades ago, she was the one who figured out what the aliens were asking in their original message, and he's sure that she'll be pivotal in cracking the current one.

As McGavin says, "Planets don't talk to each other. People *do. Some specific person on Sigma Draconis II sent the message, and one specific person on this planet—you, Dr. Sarah Halifax—figured out what he'd asked for, and organized our reply. You've got a pen pal, Dr. Halifax. It happens that I, not you, pay the postage, but he's* your *pen pal."*

And so, McGavin says, Sarah needs to be around for subsequent exchanges of messages, even though, because of the speed-of-light time lag, decades will elapse between each one.

Don thinks McGavin is being both ridiculous and cruel, and tells him so: he and Sarah both know that they have only a few years of life left.

Maybe not, says McGavin. He offers to pay for a rollback *for Sarah: a new technique that can rejuvenate a person. It costs billions, but it'll return Sarah to being physically in her mid-twenties, giving her many decades of additional life to continue the dialogue with the aliens.*

Sarah is startled but intrigued. But she immediately sets out one nonnegotiable condition: McGavin must also pay for a rollback for her husband Don. McGavin initially balks—Don was an audio engineer and producer for CBC Radio before he retired; he's of no use to the SETI effort, and the process is supremely expensive. But the rich man relents, and, after considerable soul-searching, Sarah and Don agree to undergo the procedure.

Tragically, though, the procedure works for Don, but not for Sarah. Rejuvenex, the company that performed the *treatment, thinks the failure of Sarah to become young again may be related to experimental therapies she underwent decades previously for breast cancer—but regardless of the cause, there's nothing they can do. Although it'll take months for Don's rolling back to complete, it's inexorable: he's going to end up being physically in his mid-twenties, while Sarah will remain in her late eighties.*

The current message from Sigma Draconis remains unreadable, locked behind an encryption algorithm that the aliens have clearly explained in a header to their message but to which they've failed to provide the decryption key.

In trying to figure out what that key might be—and to keep her mind off the growing age gap between her and her husband—Sarah spends a lot of time contemplating the first message from Sigma Draconis, received way back in 2009. In it, the aliens established that although it's technically correct to write the result of the question "What is eight divided by twelve?" as either 2/3 or 4/6, the answer 2/3 is preferable *(because the fraction has been reduced). They also established that whether the number one is or isn't a prime number is a matter of opinion. This mathematical vocabulary allowed them to explore moral issues in the rest of their message.*

Sarah vividly recalls the fateful day all those years ago when she finally figured out exactly what the first message was, and what sort of reply the aliens wanted. Her breakthrough had been recognizing that the first message from Sigma Draconis was a survey—a questionnaire on moral and ethical conundrums, laid out with spaces for a thousand sets of replies; the aliens apparently wanted to see a cross-section of human responses.

Sarah had ended up orchestrating the gathering of anonymous replies through a web site, and, at the urging of her son **Carl***, who had been sixteen then, she had included her own set of survey responses in the bundle of replies sent to Sigma Draconis.*

Now, though, in 2048, Sarah and Don are sadly growing apart. Don has much more physical energy than she does, and that's leading to dissatisfaction in the bedroom. Also, Don's mental acuity has improved since the rollback, causing him, despite his best intentions, to feel irritation at Sarah's difficulty in remembering things.

Don tries to get back his old job—or any job—at CBC Radio, but there's no place for him there. His technical knowledge is decades out of date, and middle-aged employees won't be happy being managed by someone who looks twenty-five. On top of all that, Don's old friends, near the ends of their natural lives, are insanely jealous that he's been given decades more to live. Don is so despondent that he contemplates suicide; after all, he reasons, his life had been almost over before this procedure—ending it now would just be setting things right.

Sarah, believing the decryption key must be something in one of the thousand sets of survey replies sent to Sigma Draconis four decades ago, sends Don down to the University of Toronto to retrieve archived paper copies of those replies. There, Don meets **Lenore Darby***, a twenty-five-year-old SETI grad student working on a master's degree. To Don's delight, she shares his passion for the game Scrabble. They end up having an innocent lunch together, and later in the day, with Sarah's permission, Don joins Lenore and other grad students for chicken wings at a pub.*

Lenore is under the impression that Don is Sarah's grandson, rather than her husband, and she's touched when Don vigorously defends Sarah against dismissive comments made by one of the other grad students. Lenore lives in a rough neighborhood a few blocks *from the pub, and she asks Don to walk her home. Once there, she kisses him, and, before Don knows what's happening, they're in bed—the real twenty-five-year-old and the old married man who only appears that way . . .*

Don is overcome with guilt about having slept with the young Lenore. Having promised to call her, he does—with the intention of telling her he can never see her again. But he instead agrees to go out with her once more—and while doing so realizes what he should have seen all along: that Lenore reminds him of what his wife Sarah was like when he had first met her.

When Don returns home from his day out with Lenore, he finds that Sarah has fallen down the stairs at their house and broken her leg; she's been lying face down on the floor, waiting for hours for him to return.

Cody McGavin had promised any help Sarah might need to decrypt the current Dracon message, and so Don and Sarah ask him to provide a Mozo—a robot designed to aid the elderly with household tasks and provide medical care. They name their new robot **Gunter**, *and he quickly proves indispensable—and his presence makes it possible for Don to continue to see Lenore without worrying about something happening again to Sarah.*

Sarah's grandson **Percy**, *now in grade eight, is doing a school project on ethics, and asks Sarah some questions about her views on abortion, including the rights of fathers to participate in the decision process. Sarah admits that her thinking on such issues has been ambivalent for many years.*

Meanwhile, Gunter has become Sarah's confidant, and she divulges to him that she's aware that Don is straying—but also understands that had their circumstances been reversed, she would have left him.

When Don next sees Lenore, he comes clean, telling her not only his true age of eighty-seven, but also that he's married to Sarah Halifax. Lenore throws him out. Later, though, Lenore regrets her decision. She hardly approves of Don's duplicity, but she has been deeply touched by his wisdom and gentleness, qualities the guys she knows who really are twenty-five sorely lack, and so she contacts Don, and the two of them get back together.

Belatedly, Don realizes that his hormones are running amuck, a side effect of the rollback; a chemical imbalance might also have been responsible for his earlier suicidal thoughts. He tells a Rejuvenex doctor about this, and she prescribes treatments to get his biochemistry back into balance.

Don's younger brother, eight-five-year-old **Bill**, *suddenly dies, and Don presents the eulogy at Bill's funeral. He has an epiphany while doing so: he must somehow make the most of the profound gift of rejuvenation that he's been given . . .*

Chapter 35

Don and Sarah went to bed early the night after the funeral, both exhausted. She fell asleep at once, and Don rolled onto his side, looking at her.

He had no doubt the antidepressants Petra had given him were working. He was having a better time dealing with life's little irritations, and, on a larger level, the idea of killing himself now seemed totally alien—the remembered joke about public speaking aside, not for one second had he wished today to trade places with his brother.

The hormone adjustments were working, too; he was no longer hornier than a hoot owl. Oh, he was still frisky, but at least he felt he had some measure of control now. But although his lust for Lenore might have abated somewhat, his love had not. *That* had never been just raging hormones; of that he was sure.

Nonetheless, he had an obligation to

Sarah that predated Lenore's birth by decades; he knew that. Sarah needed him, and although he didn't need her—not in the sense of requiring her assistance with day-to-day living—he *did* still love her very much. Until recently, the quiet, gentle relationship they'd grown into had been enough, and surely it could *still* be enough, for whatever time they had left together.

And, besides, the current situation was unfair to Lenore. There was no way that he could be the lover she deserved, her full-time companion, her life partner.

To break up with Lenore, he knew, would feel like amputation—like cutting off a part of himself. But it *was* the right thing to do, although—

Although a typical young man losing a young woman might console himself by thinking that there are plenty of other fish in the sea, that someone equally or even more wonderful was bound to come along soon. But Don had lived an entire life already, and in all of it, he'd only met two women who had captivated him, one in 1986 and the other in 2048. The chances of meeting a third, even in the many decades he had left, seemed exceedingly slim.

But that was beside the point.

He knew what he had to do.

And he would do it tomorrow, even though . . .

No, that didn't matter. No excuses.

He would do it tomorrow.

The calendar waits for no man, and, as it happened, today, Thursday, October fifteenth, was Don's birthday. He hadn't told Lenore that it was coming up; he hadn't wanted her spending any of what little money she had on a present for him, and now, of course, given what he was planning to do today, he was doubly glad that he'd kept it to himself.

And besides, was an eighty-eighth birthday significant, if your body had been rejuvenated? When you're a kid, birthdays are a big deal. By middle age, they're given much less importance, with parties only for those that begin new decades, and maybe some moments of quiet reflection when one's personal clock clicks over to a number ending in a five. But after a certain age, it changes again. Every birthday is to be celebrated, every birthday is an accomplishment . . . because every birthday might be one's last—except when you've had a rollback. Was his eighty-eighth to be fussed about or ignored?

And it wasn't as if this automatically meant that his biological age was now twenty-six instead of twenty-five. The twenty-five figure had been a guesstimate, he knew. The rollback was a suite of biological adjustments, not a time machine with digital readouts. Still, he did find himself thinking he was now physically twenty-six, and that was all to the good. Twenty-five had seemed obscenely young; there was something ridiculously insouciant about that age. But twenty-six, why, that was pushing thirty, and starting to get respectable. And even if it were only a guesstimate, he *was* getting older, just as everyone else did, one day at a time, and those days did need to be bundled together into groups, didn't they?

Today being his birthday was an unfortunate coincidence, he knew, for he'd be reminded of the end of his relationship with Lenore on each of the many birthdays he still had ahead of him.

He arrived at the Duke of York around noon, and ran into Gabby. "Hi, Don," she said, smiling. "Thanks for joining us at the food bank last weekend."

"No problem," he said. "My pleasure."

"Lenny's already here. She's in the snug."

Don nodded and headed off to the little room. Lenore had been reading on her datacom, but she looked up as he approached, and immediately got to her feet, stretching up to kiss him. "Happy birthday, sweetheart!" she declared.

"How—how did you know?"

She smiled mischievously—but, of course, almost all information was online somewhere these days. As soon as they sat down, Lenore produced a floppy package wrapped in metallic-blue paper. "Happy birthday," she said again.

Don looked at the package. "You shouldn't have!"

"What sort of girlfriend would I be if I missed your birthday? Go ahead, open it."

He did so. Inside was an off-white T-shirt. It had the familiar red barred-circle symbol for "No" with the word QWERTY written as six Scrabble tiles superimposed on it.

Don's jaw dropped. He'd told her the first time they played Scrabble that he disapproved of *qwerty* being in the *Official Scrabble Players Dictionary.* In his experience, it was always spelled with all caps, and capitalized words weren't legal in Scrabble. All dictionaries he'd ever consulted agreed with him about the spelling, save one: a note in *Webster's Third New International Dictionary, Unabridged,* said the term was "often not capitalized." But that same far-too-liberal dictionary said "toronto" was acceptable with a lowercase T when used as an adjective, and the *OSPD* hadn't included *that,* thank God. Since countless tournament-level games had been won using *qwerty,* nobody wanted to hear that it was bogus. As with Don's "Gunter" campaign, he'd won few converts.

"Thank you!" he said. "This is *fabulous."*

Lenore was grinning. "I'm glad you like it."

"I do. I love it!"

"And I love you," she said, giving voice to the words for the first time, as she reached across the table and took his hand.

The leaves on the trees along Euclid Avenue had turned color, a mixture of orange and yellow and brown. The year was old; winter would be upon them soon. Don and Lenore walked along, holding hands. She was chatting animatedly, as usual, but he was too preoccupied to say much, for he knew he was heading back to her place for the very last time.

Dead leaves mixed with litter were blown by an afternoon breeze along the cracked asphalt. They passed houses with boarded-up windows, and a wino camped out by a sewer grate, before they reached her place. They walked around to the side of the ramshackle house and headed down to the basement apartment. When they got in, and their jackets were removed, Lenore set about making coffee, and Don looked around. There really wasn't much that was personal to Lenore here; he knew the shabby furniture had come with the place. What few belongings she had would probably fit in a couple of suitcases. He shook his head in wonder, remembering when his own life had been so manageable, so uncluttered.

"Here," said Lenore, handing him a steaming cup. "This should help warm you up."

"Thanks."

She perched on the armrest of the couch. "And I know something else that might warm you up, Birthday Boy," she said, eyes twinkling.

But he shook his head. "Um, how 'bout we play Scrabble instead?"

"Seriously?" asked Lenore.

He nodded.

She looked at him like he was from another planet. But then she smiled and shrugged. "Sure, if you like."

They lay down on the worn carpeting, and she used her datacom to project a holographic Scrabble board between them. She drew an *E* to Don's *J,* so she went first.

Sometimes when playing Scrabble, a player will realize he has some of the letters needed to form a good word, and will set those aside at one end of his rack, hoping to acquire the others in later turns. Early in the game, Don ended up with a *Y* and a *K*, worth four and five points respectively. He passed over several opportunities to use them, but ultimately did manage to get most of what he needed, although the serious player in him hated wasting an *S*. He placed his tiles running to the left from a *P* that Lenore had put down earlier:

SKY O

"The blank is a *T*," Don said, in response to her appropriately blank expression. "Skytop."

She wrinkled her nose. "Um, I don't think that's really in the dictionary."

He nodded. "I know. I just wanted to, you know, just wanted to . . ." He stopped, tried again. "For the rest of my life, every time I hear that word, I'm going to think of you." He paused. "More than anything Rejuvenex's doctors did, more than any part of the rollback, it was you who made me feel young again, feel alive."

She smiled that radiant smile of hers. "I do love you," she said, "with all my heart."

He replied, echoing as much of her sentiment as he could. "And I love you, too, Lenore." He looked at her beautiful face, her freckles, her green eyes, her orange hair, committing them to memory. "And," he added, absolutely sure it was true, "I always will."

She smiled again.

"But," he continued, "I—I'm so sorry, darling, but—" He swallowed, and forced himself to meet her gaze. "But this is the last time we can see each other."

Lenore's eyes went wide. "What?"

"I'm sorry."

"Why?"

Don looked at the threadbare carpeting. "I'm about as grown up as it's possible for a human to be, and it's time I started acting that way."

"But, Don . . ."

"I've got an obligation to Sarah. She needs me."

Lenore began crying softly. "I need you, too."

"I know," Don said, very softly. "But I have to do this."

Her voice cracked. "Oh, Don, please don't."

"I can't give you what you need, what you deserve. I've . . . I've got a prior commitment."

"But we're so good together . . ."

"Yes, we are. I know that—and that's why this hurts so very much. I wish there were another way. But there isn't." He swallowed hard. "The stars are aligned against us."

Don made his way slowly, sadly back to the subway, bumping into pedestrians, including one robot, on Bloor Street's sidewalk, and getting honked at as he stepped into traffic without checking the light.

He wasn't up to changing trains—something he'd have to do if he took the shortest route—and so he decided to go south. He'd go down one side of the great U and then almost all the way up the other side.

He waited for the train to arrive. When it did, there was a mad scrum as passengers jostled to get on while others were still trying to get off. Don remembered how it used to be when he was young: people wanting to get on stood to either side of the subway doors, and waited patiently until all those who wished to get off had done so. Somewhere along the line, that little civility—like so many of those that had once allowed Toronto to actually deserve its nickname of "Toronto the Good"—had fallen by the wayside, despite all the P.A. announcements urging orderly behavior.

The train was crowded, but he managed to get a seat. And, as the train started up, he thought nothing about that. He was used to people offering him a seat; some few crumbs of goodness still existed, he supposed. But it came to him that although he was indeed eightyeight, as of today, there were people who *looked* that old who really needed to sit down. He got up and motioned for an elderly woman wearing a sari to take his seat, and she rewarded him with a very grateful smile.

As it happened, he was in the first car. At Union, lots of people got off the subway, and Don maneuvered close to the front window, next to the driver's cubicle, with its robot within. Some stretches of the tunnel were cylindrical, and they were illuminated by rings of light at intervals. The effect reminded him of an old TV series, *The Time Tunnel*, a show he'd enjoyed in the same way he'd enjoyed *Lost in Space*, for the nifty art direction, while cringing at the stupid stories.

After all, you can't go back in time.

You can't undo what's done.

You can't change the past.

You can only, to the best of your abilities, try to meet the future head-on.

The train rumbled on, through the darkness, taking him home.

Don came into the entryway and paused, looking down at the tiles, at where Sarah had once lain, fallen, waiting for him to return. He took the six stairs one at a time, trudging up into the living room.

Sarah was standing by the mantel, looking either at the holos of their grandchildren or at her trophy from Arecibo; with her back to him, it was impossible to tell which. She turned around, smiled, and started walking toward him. Don's arms opened automatically, and she stepped into them. He hugged her lightly, afraid of breaking her bones. Her arms against his back felt like sapling branches pushed by a gentle breeze. "Happy birthday again," she said.

He glanced past her, at the foot-high digital display on the wall monitor, and saw it change from 5:59 to 6:00. When they let go of each other, she started a slow walk toward the kitchen. Rather than hurry ahead, Don fell in behind her, taking one step for every two of hers.

"You sit down," Don said, when they'd finally made it into the kitchen. Although he knew he shouldn't, he found Sarah's slow, methodical movements frustrating to watch. And, besides, he ate three times as much food as she did these days; he *should* do the work. "Gunter," he said—loudly, but certainly not yelling; it wasn't necessary to yell. The Mozo appeared almost at once. "You and I are going to make dinner," he said to the robot.

Sarah slowly lowered herself onto one of the three wooden chairs that encircled the little kitchen table. As Don and Gunter moved about the cramped space, getting down a pot and a frying pan and finding ingredients in the fridge, he felt her eyes upon him.

"What's wrong?" she asked at last.

He hadn't said anything, and he'd taken pains not to bang cookware or utensils together. But Sarah had known him for so long now, and even if the veneer on his body had changed his body language doubtless hadn't. Whether it had been the way he'd been hanging his head, or simply the fact that he wasn't speaking except to give Gunter the occasional perfunctory instruction that tipped her off, he couldn't say. But he couldn't hide his moods from her. Still, he tried to deny it, futile though he knew that would be. "Nothing."

"Did something go wrong downtown today?" she asked.

"No. I'm just tired, that's all." He said it while bent over a chopping board, but stole a sideways glance at her, to gauge her reaction.

"Is there anything I can do?" she asked, her brow knitted in concern.

"No," said Don, and he allowed himself one more, final lie—just this one last time. "I'll be fine."

Chapter 36

Sarah woke with a start. Her heart

was pounding probably more vigorously than was healthy at her age. She looked over at the digital clock. It was 3:02 A.M. Next to her lay Don, his breathing making a gentle sound with each exhale.

The idea that had roused her was so exciting she thought about waking him, but, no, she wouldn't do that. After all, it *was* a long shot, and he'd been having so much trouble sleeping lately.

Her side of the bed was the one near the window. A million years ago, when they'd chosen who would sleep where, Don had said she should have that side so she could look out at the stars anytime she wished. It was an ordeal getting out of bed. Her joints were stiff, and her back hurt, and her leg was still healing. But she managed it, pushing off her nightstand, forcing herself to her feet as much through an effort of will as through bodily strength.

She took small, shuffling steps toward the door, paused and steadied herself for a moment by holding onto the jamb, then continued out into the corridor and made her way to the study.

The computer's screen was blank, but it came to life the moment she touched the scroller, bringing up a suitably dim image for viewing in the darkened room.

Within moments, Gunter was there. He'd been downstairs, Sarah imagined, but he'd doubtless heard her stir. "Are you all right?" he asked. He had lowered the volume of his voice so much that Sarah could only just make it out.

She nodded. "I'm fine," she whispered. "But there's something I've got to check out."

Sarah loved stories—even apocryphal ones—about *ah hah!* moments: Archimedes jumping out of his bath and running naked down the streets of Athens shouting "Eureka!," Newton watching an apple fall (although she preferred the even-less-likely version about him being hit on the head by a falling apple), August Kekule waking up with the solution to the structure of the benzene molecule after dreaming of a snake biting its own tail.

In her whole career, Sarah had only ever had one such epiphany: that time, long ago, while playing Scrabble in this very house, when she'd realized how to arrange the text of the first message from Sigma Draconis.

But now, perhaps, she was having another.

Her grandson Percy had asked her about her views on abortion, and she'd told him that she'd gone back and forth on some of the tricky points.

And she had, her whole life.

But what she'd remembered just now was another night, like this one, when she'd woken at 3:00 A.M. That night had been Sunday, February 28, 2010, the day before the response to the initial Dracon message was to be sent from Arecibo. She and Don were in their VSQ cabin at the Arecibo Observatory, the fronds slapping against its wooden walls making a constant background hushing sound.

She'd decided she wasn't happy with her answer to question forty-six. She'd said "yes," the mother's wishes should always trump the father's during a mutually desired pregnancy, but then she'd found herself leaning toward "no." And so Sarah had gotten out of the narrow bed. She fired up her notebook, which contained the master version of the data that would be transmitted the next day, changed her answer to that one question, and recompiled the response file. Her notebook would be interfaced to the big dish tomorrow, and this revised version would be the one actually sent.

It didn't matter much, she'd thought at the time, in the grand scheme of things, what one person out of a thousand said in response to any one question, but Carl Sagan's words had echoed in her head. "Who speaks for the Earth? We do." *I do.* And Sarah had wanted to give the Dracons the truest, most honest answer she could.

By that point, copies of the supposedly finalized reply had already been burned to CD-ROM, and the backup hardcopy printout Don had recently retrieved from U of T had already been made. Sarah had forgotten all about that night in Puerto Rico, some thirty-eight years in the past, until moments ago.

"Is there anything I can do to help?" Gunter asked.

"Just keep me company," Sarah said.

"Of course."

While Gunter looked over her shoulder, she began to softly dictate instructions to the computer, telling it to bring up a copy of her old set of responses to the Dracon questionnaire.

"Okay," she said to the computer. "Go to my answer to question forty-six."

The highlight on the screen moved.

"Now, change that answer to 'no,'" she said.

The display updated appropriately.

"Now, let's recompile all my answers. First . . ." and she went on, giving instructions that were dutifully executed.

"Your pulse is elevated," said Gunter. "Are you okay?"

Sarah smiled. "It's called excitement. I'll be fine." She addressed the computer again, fighting to keep her voice steady: "Copy the compiled string into the clipboard. Bring up the reply we received from the Dracons . . . Okay, load the decryption algorithm they provided." She paused to take a deep, calming breath. "All right, now paste in the clipboard contents, and run the algorithm."

The screen instantly changed, and—

Eureka!

There it was: long sequences spelled out in the vocabulary established in the first message. Sarah hadn't looked at Dracon ideograms in decades, but she recognized a few at once. That block was the symbol for "equals," that upside-down T meant "good." But, like any language, if you don't use it, you lose it, and she couldn't read the rest.

No matter. There were several programs available that could transliterate Dracon symbols, and Sarah told her computer to feed the displayed text into one of those. At once, the screen was filled with a rendering of the alien message in the English notation she had devised all those years ago.

Sarah used the scroller to quickly page through screen after screen of decrypted text; the message was massive. Gunter, of course, could read the screens as fast as they were displayed, and he surprised Sarah at one point by very softly saying, "Wow." After a bit, Sarah jumped back to the beginning, adrenaline surging. Most of the introductory text was displayed as black, but some words and symbols were color-coded, indicating a degree of confidence in the translation—the meanings of some Dracon terms were generally agreed upon; others were still contentious. But the gist was obvious, even if a few subtleties were perhaps being lost, and, as she took it all in, she shook her head slowly in amazement and delight.

Chapter 37

Don woke up a little before 6:00 A.M., some noise or other having disturbed him. He rolled over and saw that Sarah wasn't there, which was unusual this early in the morning. He rolled the other way, looking into the little *en suite*, but she wasn't there, either. Concerned, he got out of bed, headed out into the corridor, and—

And there she was, and Gunter, too, in the study.

"Sweetheart!" Don said, entering the room. "What are you doing up so early?"

"She has been up for two hours and forty-seven minutes," Gunter said helpfully.

"Doing what?" Don asked

Sarah looked at him, and he could see the wonder on her face. "I did it," she said. "I figured out the decryption key."

Don hurried across the room. He wanted to pull her up out of the chair, hug her, swing her around—but he couldn't do any of those things. Instead, he bent down and kissed her gently on the top of her head. "That's fabulous! How'd you do it?"

"The decryption key was my set of answers," she said.

"But I thought you'd tried that."

She told him about the last-minute change she'd made in Arecibo. While she did so, Gunter knelt next to her, and began scrolling rapidly through pages on the screen.

"Ah," Don said. "But wait—wait! If it's your answers that unlocked it, that means the message is for you personally."

Sarah nodded her head very slowly, as if she herself couldn't believe it. "That's right."

"Wow. You really do have a pen pal!"

"So it would seem," she said softly.

"So, what does the message say?"

"It's a—a blueprint, I guess you could call it."

"You mean for a spaceship? Like in *Contact?*"

"No. Not for a spaceship." She looked briefly at Gunter, then back at Don. "For a Dracon."

"What?"

"The bulk of the message is the Dracon genome, and related biochemical information."

He frowned. "Well, um, I guess that'll be fascinating to study."

"We're not supposed to study it," Sarah said. "Or at least, that's not *all* we're supposed to do."

"What then?"

"We're supposed to"—she paused, presumably seeking a word—"to *actualize* it."

"Sorry?"

"The message," she said, "also includes instructions for making an artificial womb and an incubator."

Don felt his eyebrows going up. "You mean they want us to *grow* one of hem?"

"That's right."

"Here? On Earth?"

She nodded. "You've said it yourself. The only thing SETI is good for is the transmission of information. Well, DNA is nothing but that—information! And they've sent us all the info we need to make one of them."

"To make a Dracon baby?"

"Initially. But it'll grow up to be a Dracon adult."

There was only one chair in the room. Don moved so he could perch on the desk, and Sarah swiveled to face him. "But . . . but it won't be able to breathe our atmosphere. It won't be able to eat our food."

Sarah motioned at the screen, although Don could no longer see what was on it. "They give the composition of the air it will require: needed gases and their acceptable percentages, a list of gases that are poisonous, the tolerable range of air pressure, and so on. You're right that it won't be able to breathe our air directly; we've got too much CO_2 in our atmosphere, for one thing. But with a filter mask, it should be fine. And they've given us the chemical formulas for the various foodstuffs it will need. I'm afraid Atkins didn't catch on beyond Earth; it's mostly carbohydrates."

"What about—I don't know, what about gravity?"

"Sigma Draconis II has a surface gravity about one and a third times our own. It should have no trouble with ours."

Don looked at Gunter, appealing to the robot's rationality. "This is crazy. This is nuts."

But Gunter's glass eyes were implacable, and Sarah simply said, "Why?"

"Who would send a baby to another planet?"

"They're not sending a baby. Nothing is traveling."

"All right, fine. But what's the point, then?"

"Did you ever read—oh, what was his name, now?"

Don frowned. "Yes?"

"Damn it," said Sarah, softly. She turned to face Gunter. "Who wrote 'What is it Like to Be a Bat?'"

The Mozo, still looking at pages of

text, said at once, "Thomas Nagel."

Sarah nodded. "Nagel, exactly! Have you ever read him, Don?"

He shook his head.

"That paper dates back to the 1970s, and—"

"October 1974," suppled Gunter.

"—it's one of the most famous in all of philosophy. Just like the title says, it asks, 'What's it like to be a bat?' And the answer is, fundamentally, we'll never know. We can't even begin to guess what it's like to have echolocation, to perceive the world in a totally different way. Well, only a flesh-and-blood Dracon, with Dracon senses, can report to the home world what it's really like, from a Dracon's point of view, here on Earth."

"So they want us to make a Dracon who'll grow up to do that?"

She shrugged a bit. "For thousands of years, people on Earth have been born to be kings. Why shouldn't someone be born to be an ambassador?"

"But think of the existence it would have here, all alone."

"It doesn't have to be. If we can make one, we can make several. Of course, they'll be genetically identical, like twins, and—"

"Actually, Sarah," said Gunter, standing back up now, "I've been reading further into the document. It's true that they only sent one master genome, but they've appended a tiny subset of modifications that can be substituted into the master sequence to make a second individual. Apparently, the DNA code provided was taken from two pair-bonded Dracons. Any living expressions of that DNA would be clones of those individuals."

"'If you were the only girl in the world, and I was the only boy . . .'" said Don. "At least they'll each know who to ask to the prom." He paused. "But, I mean, how do we even know that they've sent the genome for an actual, intelligent Dracon? It could be the genome for some, y'know, vicious monster, or for a plague germ."

"Of course, we'd create it in a biologically secure facility," said Sarah. "Besides, what would be the point of sending such a thing?"

"The message says the individuals whose genomes have been provided are alive on Sigma Draconis II," said Gunter. "Or, at least they were when this message was sent. They hope to converse with their clones here, albeit with a 37.6-year roundtrip message time."

"So the source Dracons back home are like the parents?" asked Don. Through the window opposite him, he could see that the sun was coming up.

"In a way," said Sarah. "And they're looking for foster parents here."

"Ah, yes. The questionnaire!"

"Right," she said. "If you were going to have someone raise your children, you'd want to know something about them first. And, I guess, of all the answers they received, they liked mine best; they want me to raise the children."

"My . . . God," said Don. "I mean . . . my God."

Sarah shrugged a little. "I guess that's why they cared about things like the rights of the parent who wasn't actually carrying the child."

"And the abortion questions—were they to make sure we wouldn't get cold feet and terminate the fetuses?"

"Maybe. That would certainly be one interpretation. But remember, they liked my answers, and although I was willing to concede rights to the parent who wasn't carrying the child, the rest of my answers must have made it pretty darn clear that I'm pro-choice."

"Why would that make them happy?"

"Maybe they wanted to see if we've transcended Darwin."

Don frowned. "Huh?"

"You know, if we've gotten past being driven by selfish genes. I mean, in a way, being pro-choice *is* anti-Darwinian, because it tends to reduce your reproductive success, assuming you terminate normal fetuses that you could have raised, without unreasonable cost, to adulthood. Doing that would be one psychological marker for no longer being bound by Darwinian notions, for having broken free of mindless genetic programming, for ceasing to be a lifeform driven by genes that want nothing but to reproduce themselves"

"I get it," said Don, watching now as the window autopolarized in response to the rising sun. "If all you care about are your own genes then, by definition, you don't care about aliens."

"Right," said Sarah. "Notice they asked for a thousand survey replies. That means they knew we wouldn't have just one set of views. Remember, you used to say that alien races either would become hive minds or totalitarian, because, after a certain level of technological sophistication is reached, they simply couldn't survive any longer if they allowed the kind of discontent that gives rise to terrorism. But there must be some third alternative—something better than being Borg or having thought police. The aliens on Sigma Draconis apparently knew they would be dealing with complex, contradictory individuals. And they looked at the thousand responses and decided that they didn't want anything to do with human beings in general—they only wanted to communicate with one oddball." She paused. "I guess I'm not surprised, since most of the sets of survey answers *did* suggest ethnocentrism, exclusive concern about one's own genetic material, and so on."

"But knowing you, yours didn't suggest those things. And that's what makes you the one they want to be the foster mother, right?"

"Which surprises the heck out of me," Sarah said.

But Don shook his head. "It shouldn't, you know. I told you this ages ago. You're special. And you are. SETI, by its very nature, transcends species boundaries. Remember that conference you attended in Paris, all those years ago? What was it called?"

"I don't . . ."

Gunter spoke up. "'Encoding Altruism: The Art and Science of Interstellar Message Composition.'" Don looked at the Mozo, who did a mechanical shrug. "I've read Sarah's CV, of course."

"'Encoding altruism,'" repeated Don. "Exactly. That's the fundamental basis of SETI. And, well, you were the only SETI researcher whose answers were sent to Sigma Draconis. Is it any wonder that the recipients, who, by definition, are also in the SETI business, found your responses to be the closest to what they were looking for?"

"I suppose. But . . ."

"Yes?"

"My child-rearing days are way behind me. Not that that's unusual, I suppose, in a cosmic sense."

Don frowned. "Huh?"

"Well, Cody McGavin was probably right. The Dracons, and just about every other race that survives technological adolescence, almost certainly is very long-lived, if not out-and-out-immortal. And unless you're endlessly expansionist, moving out to conquer new worlds constantly, you'd soon run out of room if you kept breeding *and* lived forever. The Dracons have probably all but given up reproducing."

"I guess that makes sense."

Sarah's eyebrows went up. "In fact, *that* might be the third alternative!"

"Huh?"

"Evolution is a blind process," said Sarah. "It has no goal in mind, but that doesn't mean it doesn't have a logical outcome. It selects for aggression, for physical force, for being protective of one's blood relations—for all the things that ultimately contribute to technological races destroying themselves. So maybe the Fermi paradox isn't a paradox at all. Maybe it's the natural result of evolution. Evolution eventually gives rise to technology, which has a survival value *up to a point*—but once technologies of mass destruction are readily available, the psychology that the Darwinian engine forces on lifeforms almost inevitably leads to their downfall."

"But if you stop breeding—"

"Exactly! If you voluntarily opt out of evolution, if you cease to struggle to get more copies of your own DNA out there, you probably give up a lot of aggression."

"I guess that does beat becoming a hive mind or totalitarian," said Don. "But—but, wait! They're reproducing now, in a way, by sending their DNA here."

"But only two individuals."

"Maybe they breed like rabbits, though. Maybe it's a way of launching an invasion."

"That's not a concern," Gunter said. "The two individuals are both of the same sex."

"But you said the source Dracons were pair-bonded . . ." Don stopped himself. "Right, of course. How provincial of me. Well, well, well . . ." He looked at Sarah. "So what are you going to do?"

"I—I don't know. I mean, it's not like the artificial womb and incubator are things you and I could cobble together out in the garage."

Don frowned. "But if you tell the world, governments will try to control the process, and—forgive me, but they'll probably try to squeeze you out."

"Exactly," said Sarah. "The Dracons surely understand that upbringing is a combination of nature and nurture. They wanted a specific sort of person to be responsible for the . . . the Draclings. Besides if the genome gets out, who's to say that others wouldn't create Dracons just to dissect them, or put them in zoos?"

"But once the child is born, anyone could steal its DNA, no? Just by picking up some of its cells."

"They might be able to get that, but not the plans for the incubator or all the other things. Without actual access to the full message, it would be very hard to create a Dracon." She paused, considering. "No, we have to keep this secret. The Dracons entrusted the information to me, and I've got an obligation to protect it."

Don rubbed the sleep from his eyes. "Maybe—but there'll be those who'll say you should release all the information. They'll say your principal obligation is to your own kind."

But Sarah shook her head. "No," she said. "It isn't. That's the whole point."

Chapter 38

"It's important," Sarah said a few hours later, "that you commit to memory the decryption key—not the whole thing, of course, but how to recover it."

Don nodded. They were sitting in their kitchen, eating a late breakfast. He was now dressed in a T-shirt and jeans; she was wearing a robe and slippers.

"My survey was number 312 out of the thousand sent," she said, "and I changed my answer to one of the questions at the very last minute: It was question forty-six, and the answer I actually sent was 'no.' Got that?"

"Three-twelve, forty-six, and no. Can I write that down somewhere?"

"As long as you don't put any explanatory text with it, sure."

"So number forty-six was the magic question? The one the Dracons cared about the most?"

"What? No, no. It just happened to be the one I changed my answer to. The key consists of all eighty-four of my answers exactly as I actually transmitted them. Any time you need the key you can reproduce it by looking up the archival copies of what was supposedly sent to Sigma Draconis, and making that one change."

"Got it."

"Now, make sure you keep it secret!"

He looked across the table at his wife, who seemed visibly older, and not just because she'd gotten very little sleep. Over the last few weeks, she had aged noticeably. "I, ah, don't think we can keep it secret from *everybody,"* he said. "I really think you need to tell Cody McGavin."

Sarah was hugging a cup of coffee with both hands. "Why?"

"Because he's one of the richest people on the planet. And a project like this is going to take deep pockets. Synthesizing the DNA, building the womb, building the incubator, synthesizing the food, and, I'm sure, lots of other things. You need somebody like him to come on board."

Sarah was quiet.

"You have to tell *someone,"* Don said. "You'll . . ."

He trailed off, but she nodded. "I'll die soon. I know." She paused, considering, and Don knew enough to just let her do that. After a time she said, "Yeah, you're right. Let's call him."

Don crossed the room, got the cordless handset, and told it who he wanted to speak to. After a few rings, a crisp, efficient voice came on. "McGavin Industries. Office of the president."

"Hello, Ms. Hashimoto," Don said. "It's Donald Halifax."

Her voice became slightly cold. They had, after all, butted heads repeatedly during his many attempts to reach McGavin back in the spring. "Yes, Mr. Halifax?"

"Don't worry. I'm not calling about the rollback. And, in fact, it's not me who's calling at all. I just dialed the phone for my wife, Sarah. She'd like to speak to Mr. McGavin about the Dracon message."

"Ah," said Ms. Hashimoto. "That would be fine. Please hold. I'll put you through."

Don covered the mouthpiece and spoke to Sarah. "She's putting the call through." Sarah motioned for him to give her the phone, but he held up a hand, palm out. After a moment, the familiar Bostonian accent came on. "Cody McGavin speaking."

"Mr. McGavin," said Don, with great relish, "please hold for Dr. Sarah Halifax." He then counted silently to ten before handing the handset to Sarah, who was grinning from ear to ear.

"Hello, Mr. McGavin," Sarah said.

Don moved close enough so that he could hear both sides of the conversation. It wasn't hard, given that the handset had automatically pumped up its volume when Sarah had taken it. "Sarah, how are you?" McGavin said.

"I'm fine. And I've got big news. I've decrypted the Dracon message."

Don could practically hear McGavin jumping up and down. "Wonderful! What does it say?"

"I—I don't want to say over the phone."

"Oh, come on, Sarah—"

"No, no. You never know who's eavesdropping."

"God, all right. We'll fly you down here again, and—"

"Um, could you come here? I'm not really feeling up to flying these days."

Don could hear McGavin blowing out air. "It's our annual stockholders' meeting in two days. There's no way I can come up until after that's over."

"All right," said Sarah. "How about Friday, then?"

"Well, I *could.* But can't you just email me the decryption key, so I can look at the message here?"

"No. I'm not prepared to divulge it."

"What?"

"The message was intended for me alone," Sarah said.

There was a long pause. Don could only imagine the incredulous look that must be on McGavin's face.

"Sarah, is, um, is Don still there? Maybe I could have a word with him . . ."

"I'm not senile, Mr. McGavin. What I'm saying is absolutely true. If you want to know what the message says, you're going to have to come here."

"Oh, all right, but—"

"And don't tell anyone that I've found the decryption key. You have to promise to keep this secret, at least until you get here."

"All right. Let me get the details of where you are . . ."

After she got off the phone, Don looked around. "Gunter does such a good job of keeping the place clean, I guess there's not much we have to do to get ready for McGavin's visit."

"There is one thing," Sarah said. "I want you to take the Dracon survey."

Don was surprised. "Why?"

She didn't quite meet his eyes. "We'll be talking a lot with McGavin about it. You should be up to speed on it."

"I'll read it over."

"No, don't just do that." She sounded emphatic. "Actually fill it out."

He raised his eyebrows. "If you like."

"I do. Go get your datacom; you can download a copy from the official response website."

He nodded. It was hardly as though he had anything better to do. "All right."

Once he'd loaded the survey, he lay down on the couch and started working through the questions. It took almost two hours, but finally he called out, "Done!"

Sarah made her way slowly into the living room, and he handed her the datacom. "Now what?" he said.

She looked at the device. "Save as 'Answers Don,'" she said to it. "Run Flaxseed. Load Answers Don. Load and unlock Answers Sarah Revised—passphrase 'Aeolus 14 umbra.' Execute."

"What are you doing?" Don said, sitting up. "What's 'Flaxseed'?"

"It's a program an ethics prof designed years ago, when we were studying the million-plus sets of survey responses that were uploaded to our website. It measures the degree of agreement between respondents. See, comparing survey responses is a bit tricky. Many of the eighty-four questions have four or five possible answers, or use graduated scales, so you can't just look for exact matches—two answers that are different might only be subtly different. A person who chooses 'A' might be thinking along the same lines as someone who chose 'B,' while someone who picked 'C' clearly has a different mindset."

"Ah," said Don. He gestured at the datacom Sarah was holding. "And?"

She glanced down at the display, then looked back up at him, a smile on her face. "I knew there was a reason I married you."

Chapter 39

"Cody McGavin arrives tomorrow," Sarah said, "and there's something we should discuss before he gets here."

They were sitting at the dining-room table, drinking coffee. "Yes?" Don said.

"It's just that I won't be able to do what the aliens want," she said.

He made his voice soft. "I know."

Light was streaming in through the window. Don could see Gunter outside, raking leaves.

"So," she continued, "I've got to find somebody else to do it, if we're going to do it at all."

He considered this. "You could use that Flaxseed program to see who else of the original respondents had replies close to yours."

She nodded. "I did that. Of the thousand sets of responses we sent, there were only two that were really close to mine. But God knows who they belonged to."

"Didn't you keep records?"

"It was an anonymous survey. Professional pollsters told us we'd get much more honest answers that way. Besides, even if we had asked for names, we wouldn't have been able to keep them. The website was at U of T, remember, and you know what Canadian privacy laws are like."

"Ah." He took a sip of coffee.

"But even if we had the names, it might not have done any good."

"Why not?"

"As I said before, McGavin was probably right, back at his office, when he said that most advanced races would likely be very long-lived. Indeed, since the Dracons apparently have ring-shaped chromosomes, they might in fact have *always* lived a very long time, since they'd have avoided one of our principal causes of aging. Anyway, although it probably never even occurred to them that anyone they were replying to might be dead a mere thirty-eight years later, probably half of those who originally filled out the survey have passed on by now."

"I suppose that's true," he said.

"But," said Sarah, looking sideways at him, "you and I had very similar answers."

"So you said."

"So, maybe, I mean, if you wanted to..."

"What?"

"You could do it. You could look after the Dracon children."

Don felt his eyebrows going up. "Me?"

"Well, you and Gunter, I suppose." She smiled. "I mean, he's a Mozo; he's designed to look after the elderly, but taking care of alien children can't be much more difficult than looking after a crazy old bat like me."

Don's head was swimming. "I—I don't know what to say."

"Well, think about it," she said. "Because you're definitely my first choice."

Months ago, when Sarah and Don were contemplating rolling back, Carl had said they'd have to do more babysitting—but that seemed to have fallen by the wayside when Sarah's rejuvenation had failed. But tonight Carl and Angela had dropped Percy and Cassie off at the house on Betty Ann. The ostensible reason was that the adults were going to see a hockey game, but Don suspected there was also a feeling that the children wouldn't have their grandmother much longer, and so they should spend time with her while they could.

Percy was thirteen, all loose limbs and long hair. Cassie, at four, was a whirlwind with pigtails. Because of the age difference, it was hard to entertain them both together, so Cassie and Sarah had gone upstairs with Gunter to look at whatever treasures Sarah's closets held, and Don and Percy were on the couch in the living room, half-watching the same hockey game Percy's parents had gone to on the TV above the fireplace, and making their own game of trying to spot Carl and Angela in the crowd.

"So," Don said, muting the sound during a commercial break, "how's grade eight treating you?"

Percy shifted on the couch a bit. "It's okay."

"When I was a kid, we went all the way to grade thirteen."

"Really?"

"Yup. Ontario was the only place in North America that had that."

"I'm glad we only have to go to grade twelve," said Percy.

"Yeah? Well, in grade thirteen we were old enough to write our own notes for missing class."

"That'd be cool."

"It was. But I actually had fun in grade thirteen. Lots of interesting courses. I even took Latin. It was practically the last year they taught that in public schools in Toronto."

"Latin?" said Percy incredulously.

Don nodded sagely. *"Semper ubi sub ubi."*

"What's that mean?"

"'Always wear underwear.'"

Percy grinned.

The game resumed. The Leafs were doing okay, although it was still early in the season. Don didn't really know the players anymore, but Percy did. "And," Don said, when there was a lull in the play, "our school had a little radio station, Radio Humberside. I was involved with that in grade thirteen, and that's what got me into my career."

Percy looked at him blankly; Don had retired long before he'd been born. "I used to work at CBC Radio," Don said.

"Oh, yeah. Dad listens to that in the

car."

Don smiled. He'd once had a friendly argument with a guy who wrote for the Canadian edition of *Reader's Digest.* "Better," Don had said, "to produce something that people only listen to in the car than something they only read on the toilet."

"So, when did you work there?" asked Percy.

"I started in 1986 and left in 2022." Don thought about adding, "And, to save you from asking, Sally Ng was prime minister when I retired," but he didn't. Still, he remembered being Percy's age and thinking World War II was ancient history; 1986 must have sounded positively Pleistocene to Percy.

They watched the game some more. The defenseman for Honolulu got three minutes for high-sticking. "So," Don said, "any thoughts about what you're going to do—" He stopped himself from saying "when you grow up." Percy doubtless thought he was plenty grown-up already—"when you finish school?"

"I dunno," he said, without taking his eyes off the screen. "Maybe go to university."

"To study . . . ?"

"Well, except on weekends."

Don smiled. "No, I meant, 'To study what?'"

"Oh. Maybe ornithology."

Don was impressed. "You like birds?"

"They're all right." Another commercial break was upon them, and Don muted the sound. Percy looked at him, and then, maybe feeling that he wasn't holding up his end of the conversation, he said, "What about you?"

Don blinked. "Me?"

"Yeah. I mean, now that you're young again. What are you going to do?"

"I don't know."

"Have you thought about going back to the CBC?"

"Actually, yeah."

"And?"

Don shrugged. "They don't want me. I've been out of the game too long."

"That sucks," Percy said, with a perplexed face, as if unused to the notion that life could be unfair to adults as well.

"Yeah," said Don, "it does."

"So what are you going to do?"

"I don't know."

Percy considered for a time, then: "It should be something—you know—something *important.* I looked up how much a rollback costs. If you're lucky enough to get one of those, you should do something with it, right?"

Don tilted his head, regarding Percy. "You take after your grandmother."

The boy frowned, clearly not sure if he liked that notion.

"I mean," said Don, turning the sound back on as the action started up again, "you're very insightful."

After Carl and Angela had picked up their kids, Don decided to go for a walk. He needed to clear his head, to think. There was a convenience store three blocks away; he would head over there to get some cashews. They were his favorite indulgence—reasonably low in carbs, but still decadent.

It was a cold, crisp night, and some houses had jack-o'-lanterns out in anticipation of Halloween; appropriately, the trees, denuded of leaves, looked like twisted skeletons writhing toward a clear, dark sky. In the distance, a dog was barking.

His walk took him along the descriptively but prosaically named Diagonal Road, which deposited him near the grounds of Willowdale Middle School. On a whim, he wandered into the school's large back field, where he used to occasionally go to watch Carl play football all those years ago. He got as far away as he could from the streetlamps—not that it made much difference—and pulled out his datacom. "Help me find Sigma Draconis," he said to it, holding up the small hinged tablet with the display facing toward him, the way he oriented it when using it as a camera.

"Turn around," the datacom said, in

its pleasant male voice. "Tilt me higher . . . higher. Good. Now move me to the left. More. More. No, too far. Back up. Yes. Sigma Draconis is in the center of the display."

"That bright one near the top?"

"No, that is Delta Draconis, also known as Nodus Secundus. And the bright one farther down is Epsilon Draconis, or Tyl. Sigma Draconis is too dim for you to see." Crosshairs appeared on the display, centered on a blank part of the sky. "But that's where it is."

Don lowered the datacom and looked directly at the same emptiness, focusing his thoughts on that star, so close by cosmic standards but still unfathomably distant on a human scale.

Somehow, despite the fact that the Dracons had been part of the background of his life for four decades now, they'd never quite seemed real. Oh, he *knew* they were there—right there, right now, along his current line of sight. Indeed, perhaps at this very moment, there were Dracons looking this way, regarding Sol—which would be almost as dim in their night sky as Sigma Draconis was in Earth's—and thinking about the strange beings that must be here. Of course, Sarah would say that the concept of a simultaneous "right now" was meaningless in a relativistic universe; even if Don could have spotted Sigma Draconis, the light he'd have seen would have left there 18.8 years ago. That discontinuity added to the unreal quality the aliens had always had for him.

But if they went ahead with what the Dracons were asking for, the aliens would go from mere abstractions to being here, in the flesh. Granted, the ones born on Earth would know nothing firsthand of their home world, but they would nonetheless be tied to it.

He closed up his datacom, slipped it into his jacket pocket, and began walking again. Maybe because he'd been thinking about prime ministers earlier, it occurred to him that Pierre Trudeau had held that office when he himself had been in middle school. There were many famous Trudeau moments, he knew: the "just watch me" response when asked how far he'd go to put down the terrorists in the October Crisis of 1970; giving the finger from his rail car to detractors in British Columbia; decriminalizing homosexuality and telling the country that "the state has no place in the bedrooms of the nation." But one that had always haunted Don was the famous walk in the snow, when Trudeau had wandered off, alone, to contemplate, weighing his own future against that of his nation. The great man had decided to quit politics that night, to step down as PM.

Trudeau had been twenty-four years younger than Don was now, but he'd been worn out, exhausted. Don, though, had lots of energy and more years ahead than he could really envision; those future years were also an abstraction, like the aliens around Sigma Draconis. Oh, one by one, the years would become concrete, but for now, they, too, didn't quite seem real.

He made his way out of the field, moving from behind the vast dark form of the school, and continued his walk. Someone was coming toward him, and Don felt a little surge of adrenaline—an old man's fear about how a late-night encounter might go. But, as the other person got closer, Don saw that it was a bald-headed middle-aged fellow, who looked quite apprehensive; to him, it was the sight of a twenty-something man that was frightening. Sarah was right; everything was relative.

She would do it in a heartbeat, he knew, if she could: she'd commit to help create, and raise, the Dracon children. And he also knew that he himself wouldn't have all this extra time ahead if it weren't for her. So maybe he owed this to his wife, and to McGavin, too, who, after all, had actually made it possible.

He continued along, and soon was approaching the convenience store. It was a 7-Eleven, one of countless such stores, all part of a vast chain. Don was old enough to remember when they really had been open only from 7:00 A.M. to 11:00 P.M., instead of twenty-four hours a day. Doubtless, if they had it to do over, the chain's management would have picked a less-restrictive name. But if a giant company couldn't have foreseen what the future held, or that the time they had to deal with would hugely expand, how could he? But, even so, they had changed; they'd adapted. And, he thought, as he went through the sliding glass doors, coming out of the darkness into the light, maybe he could, too.

Chapter 40

When Don got back home, Sarah was in the *en suite* bathroom, getting ready for bed. He joined her in there, coming up behind her as she stood at the sink, and oh-so-gently embracing her from behind.

"Hi," she said.

"All right," he replied. "I'll do it."

"Do what?"

"Look after the Dracon children."

Don's grip was loose enough that Sarah managed to gingerly rotate to face him. "Really?"

"Why not?"

"You can't do it just out of a sense of obligation, you know. Are you sure you want to do this?"

"How can I be sure about anything? I'm going to live to be maybe a hundred and sixty. That's *terra incognita* for the whole human race. I know as much about what that's going to be like as—as I know about what it's like to be a bat. But I've got to do *something*, and, as your grandson said to me this evening, it should be something important."

"Percy said that?"

Don nodded, and Sarah made an impressed face.

"Still," she said, "you have to really want this. Every child has the right to be wanted."

"I know. And I do want to do it."

"Yeah?"

He smiled. "Sure. Besides, at least I won't have to worry about these kids ending up with my nose."

Don suspected their neighbors couldn't be surprised any further by the happenings at his house, but he wondered if any of them took note of the very-expensive-looking rental car pulling into the driveway. If they did, perhaps they zoomed in on Cody McGavin as he got out, and did a face-scanning search to identify him, doubtless the richest man ever to set foot on Betty Ann Drive.

Don opened the front door and watched through the screen as McGavin walked toward him, the mesh dividing him into pixels. "Hello, Don," McGavin said, in his Boston accent. "Great to see you."

"Hello," Don replied, swinging the screen door open. "Won't you come in?" He took McGavin's heavy winter coat and watched him remove his fancy shoes, then he ushered him up the stairs to the living room.

Sarah was seated on the couch. Don saw a look flit over McGavin's face, as if he were startled by how much she'd aged since he'd last seen her. "Hi, Sarah," he said.

"Hello, Mr. McGavin."

Gunter entered from the kitchen. "Ah," McGavin said, "I see you got the Mozo we sent over."

Sarah nodded. "We call him Gunter."

McGavin's eyebrows went up. "After the robot on *Lost in Space?*"

Don was startled. "That's right."

"Gunter," said Sarah, her voice quavering as usual, "I'd like you to meet Cody McGavin. He runs the company that made you."

Don sat down next to Sarah and watched with interest: the creation meeting the creator. "Hello, Mr. McGavin," Gunter said, extending a blue mechanical hand. "It's a true pleasure to meet you."

"And you," said McGavin, shaking the

hand. "I hope you've been working hard at helping Dr. Halifax."

"He's been a godsend," said Sarah. "Haven't you, Gunter?"

"I've tried," the Mozo said to McGavin. "I was with her when she made the breakthrough. I'm very proud."

"That's my boy!" said McGavin. He turned to the Halifaxes. "Wonderful machines, aren't they?"

"Oh, yes," said Sarah. "Please, have a seat."

McGavin moved over to the La-Z-Boy. "Nice place you've got here," he said, as he settled in.

Don thought about that. McGavin was known for his philanthropy. Don had seen pictures of him visiting hovels in the third world, and it humbled him to think that this place was closer in cost to one of those than it was to McGavin's famed mansion in Cambridge. The walls here had scuffs, the plaster was chipped, the carpet was worn and stained. The couch, with its hulking lines, had perhaps been stylish late in the last century, but looked hopelessly dated now, and its wine-colored upholstery was wearing thin in a lot of places.

"All right," Sarah said at last, echoing what McGavin had said to them all those months ago, "let's talk turkey. As I said on the phone, I've succeeded in decrypting the Dracon message. Once I tell you what it says, I'm hoping you'll agree with me that we should not make the reply public."

McGavin leaned forward, a hand on his receding chin. "I'm listening. What's it say?"

"The aliens have sent us the Dracon genome—"

"Really?"

"Yes, and instructions on how to produce an artificial womb to bring a couple of Dracon children to term here on Earth, as well as plans for an incubator."

"Jesus," said McGavin softly.

"Wonderful, isn't it?" said Sarah.

"It's . . . amazing. Will they be able to live here?"

"Yes, I think so."

"Wow."

"But there's a snag," said Sarah. "The aliens want me to be, essentially, the foster parent. But I'm too old."

"Well," McGavin began, "I'm sure an appropriate lab could be set up—"

"No," said Sarah, firmly. "No labs, no institutions. These are *people,* not specimens. It'll happen in a home. As I said, I can't do it myself, but I *do* get to choose who does it in my place."

McGavin's voice was gentle, and he looked sideways at Sarah as he spoke. "I'm not quite sure that's your prerogative."

"Oh, yes it is. Because, you see, the message with the genome was addressed to me."

"You said that before. But I still don't know what you mean."

"The decryption key. It's . . . personal to me. And I'm not going to tell you what it is."

"It's not your sequence of survey answers, or any subset of that sequence," said McGavin. "We already tried that. What else could the aliens possibly know about you?"

"With all due respect, I decline to answer."

McGavin drew his eyebrows together but said nothing.

"Now," continued Sarah, "as I say, I can't personally do this. But I can pass on the genome to whomever I wish—by handing over the decryption key."

"I might be willing . . ." began McGavin.

"Actually," said Sarah, "I see you more in the rich-uncle role. Someone has to bankroll the building of the artificial womb, the synthesizing of the DNA, and so on."

McGavin shifted in the chair.

"Besides, you have a full-time job," said Don. "Hell, you've got multiple full-time jobs: president of your company, running your charitable foundation, all the public speaking you do . . ."

The rich man nodded. "True. But if

not me, then who?"

Don cleared his throat. "Me."

"You? But weren't you a—what was it?—a DJ, or something?"

"I was a recording-engineer/producer," Don said. "But that was my *first* career. It's time I started to embark on my second."

"With all due respect," McGavin said, "surely there should be a search committee."

"I'm the search committee," Sarah said. "And I've made my choice."

"Seriously, Sarah, there should be a formal selection procedure," McGavin said.

"There already has been: the Dracon questionnaire. Using that, they chose me, and I choose Don. But we need your help."

McGavin did not look happy. "I'm a businessperson," he said, spreading his arms. "What's in it for me?"

Don glanced at Sarah, and he saw her wrinkles contort. McGavin's comment made clear that his survey responses couldn't possibly be close to Sarah's—or to Don's. But she had an answer ready for him. "You'll reap any biotech benefits that come from this—not just from studying alien DNA, but from the designs for the womb and the incubator, the formulas for the alien foodstuffs, and so on."

McGavin frowned. "I'm used to fully controlling those operations I'm involved with," he said. "Will you sell me the decryption key? You can name your price . . ."

But Sarah shook her head. "We've already determined that the one thing I might want your money can't buy."

McGavin was quiet for a time, considering this, then: "You're talking about a lot of technology. I mean, sure, DNA synthesis is easy; there are commercial labs that can spit out any sequences we order up. But fabricating the artificial womb, and so forth—that may take a while."

"That's all right," Don said. "I need time to prepare, anyway."

"How?" said McGavin. "How would you prepare for something like this?".

Don shrugged. At this stage, he knew, he was just guessing. "I suppose I'll look at those models we do have: cross-fostering of chimpanzee babies into human homes, feral children, and so on. None of that is exactly comparable, but it'll give me a place to start. And . . ."

"Yes?"

"Well, I made this list years ago: twenty things I want to do before I die. One of them was visit the Dalai Lama. Not that that's likely, but I figure I should prepare . . ." he paused, surprised to hear himself using such an unfamiliar word ". . . *spiritually* for something like this."

"Well, that's easy enough to arrange," said McGavin.

"You . . . you know the Dalai Lama?"

McGavin smiled. "You've heard that old saw about six degrees of separation? The moment you met me, your score went to two degrees for just about every famous person. We'll set it up."

"Wow. Um, thanks. I just, you know, want to do a good job at . . ."

"At raising aliens," McGavin said, shaking his head, as if the idea were still sinking in.

Don tried to make it sound less portentous. "Think of it as Dr. Spock meets Mr. Spock."

McGavin looked at him blankly; he'd doubtless heard of the Vulcan, but the pediatrician's heyday had been well before his time.

"So," said Sarah, "will you help us?"

McGavin didn't look happy. "I really wish you'd let me control this; no offense, but I've got a lot more experience managing major undertakings."

"Sorry," said Sarah. "It's got to be this way. Are you with us?"

McGavin frowned, considering. "All right," he said, looking at Sarah, then back at Don. "I'm in."

Chapter 41

A few days later, Don went up to the

tudy, looking for Sarah, but she wasn't here. He continued down the corridor nd peeked into the dark bedroom, nd dimly made her out, lying on the ed.

"Sarah . . ." he said softly. It was a ough judgment call: too quiet and she ouldn't hear him regardless of hether she was awake, and too loud nd he'd awaken her if she was sleeping.

Sometimes, though, you *do* get the ight balance. "Hi, sweetheart," she said. ut her voice was weak, low.

He moved quickly to the side of the ed and crouched down. "Are you kay?"

She took a few seconds to reply, his ounding pulse counting each one off. 'm . . . I'm not sure."

Don looked back over his shoulder. Gunter!" he called. He could hear the ozo's footsteps coming up the stairs ith metronome precision. He turned ack to Sarah. "What's wrong?"

"I feel . . . dizzy," she said. "Weak . . ."

Don swung to look at Gunter's solicious blue face, which was now looming ver him. "How is she?"

"Her temperature is 38.1," said unter, "and her pulse is 84 and somehat erratic."

Don took her thin hand in his. "My od . . ." he said. "We should get you to he hospital."

"No," said Sarah. "No, it's not necesary."

"Yes, it is," said Don.

Her voice grew a little firmer. "What o you say, Gunter?"

"You're not in immediate danger," the obot said. "But you would be wise to ee your physician tomorrow."

She nodded, almost imperceptibly.

"Is there anything I can do for you ght now?" Don asked.

"No," said Sarah. She paused, and he as about to say something else, when he added, "But . . ."

"Yes?"

"Sit with me a bit, dear."

"Of course." But before he could do anything, Gunter was off like a shot. Moments later, he returned carrying the wheeled stenographer's chair Sarah used at her workstation in the study. The Mozo placed it next to the bed, and Don sat on it.

"Thank you," said Sarah, to the robot.

The Mozo nodded, his mouth looking like a flat-lining EKG.

In the morning, Sarah sat on the couch in the living room, writing on her datacom with a stylus, drafting her reply to the aliens; Cody McGavin had promised to arrange for it to be sent.

So the Dracons would know her message was from their intended recipient, she would ultimately encrypt it using the same key that had decrypted the Dracons' message to her. For now, she was using the English-like notation system she'd developed; later, she'd have a computer program translate the message into Dracon ideograms:

```
!! [Sender's] [Lifespan] <<
[Recipient's] [Lifespan]

[Recipient's] [Lifespan] &
[Sender's] [Lifespan] ≈ [End]
```

As she jotted down the pseudocode, a more colloquial version ran through her head: *I've figured out that my lifespan is much shorter than yours. Your life goes on and on, but mine is near its end* . . .

She would go on to tell the Dracons that although she couldn't personally do what they'd asked, she'd found a worthy successor, and that they should look forward to receiving reports from their representatives here.

She looked at the words and symbols she'd written so far; the datacom had converted her shaky handwriting into crisp, clean text.

But mine is near its end . . .

Almost ninety years of life, sixty years of marriage. Who could say it was too little? And yet . . .

And yet.

A thought came to her, from so many years ago, from her first date with Don, when they'd gone to see that *Star Trek* film—the one with the whales; he'd know which number it was. Funny how she could remember things from long ago, but had trouble with more recent stuff; she vividly recalled how the film began, with a screen proclaiming:

The cast and crew of Star Trek *wish to dedicate this film to the men and women of the spaceship* Challenger *whose courageous spirit shall live to the 23rd century and beyond. . . .*

Sarah also remembered the other Shuttle disaster, the one in 2003, when *Columbia* had disintegrated on reentry.

She'd been devastated both times, and although it was ridiculous to try to weigh one tragedy against the other, she remembered what she'd said to Don after the second one: she'd rather have been part of *Columbia*'s crew than have been aboard *Challenger*, for the people aboard *Columbia* died at the end of their mission, on the way home—on the *voyage* home. They'd lived long enough to see their lifelong dream realized. They'd gone into orbit, had floated in microgravity, and had looked back down on the wonderful, chaotic, hypnotic blue vista of the Earth. But the *Challenger* astronauts had died within minutes of lifting off, without ever making it into space.

If you have to die, better to die after achieving your goals rather than before. She had lived long enough to see aliens detected, to send a response, and to receive a reply, to engage in a dialogue, however brief. So this was now *after*. Even if there was a lot that she would have liked to have been part of yet to come, this was still after. This was after so very much.

She lifted her stylus to continue writing, and, as she did so, a teardrop fell onto the datacom's display, magnifying the text beneath.

How does one die in the age of mira cle and wonder? Incipient strokes an heart attacks are easily detected and pre vented. Cancers are simple to cure, a are Alzheimer's and pneumonia. Acc dents still happen, but when you have Mozo to look after you, those are rare.

But, still, at some point, the body *doe* wear out. The heart grows weak, th nervous system falters, catabolism fa outpaces anabolism. It's not as dramati as an aneurysm, not as painful as a cor nary, not as protracted as a cance There's just a slow fade to black.

And that's what had been happening step by tiny step, to Sarah Halifax, un til—

"I don't feel very well," she said on morning, her voice weak.

Don was at her side in an instant She'd been sitting on the couch in th living room, Gunter having carried he in a chair downstairs about an hour ea lier. The robot came over almost a quickly, scanning her vital signs with hi built-in sensors.

"What is it?" Don asked.

Sarah managed a weak smile. "It's ol age," she said. She paused and breathe in and out a few times. Don took he hand, and looked up at Gunter.

"I will summon Dr. Bonhoff," the ro bot said, his voice sounding sad. At th very end of life, house calls had com back into fashion; there was no need t tie up a hospital bed for someone wh had no hope of getting better.

Don squeezed her hand gently. "Re member what we agreed," she said, he voice low but firm. "No heroic mea sures. No pointless prolonging of life."

"She's not going to last the night, said Dr. Tanya Bonhoff, after ministerin to Sarah for several hours. Bonhoff was broad-shouldered white woman o about forty, with close-cropped blon hair. Don and she had withdrawn fron the bedroom, and now were standing i the study, the computer monitor blank.

He felt his stomach clenching. Sarah had been promised another six or eight decades, but now . . .

He groped for the stenographer's chair and lowered himself unsteadily onto it.

Now, she might not have another six hours.

"I've given her painkillers, but they won't affect her lucidity," the doctor said.

"Thank you."

"I think you should phone your children," she said gently.

Don returned to the bedroom. Carl was on a business trip to San Francisco; he'd said he'd take the next possible flight, but even if he could get a red-eye, he still wouldn't be in Toronto until morning. And Emily was out-of-town as well, helping a friend close up his cottage for the winter; she was now racing back, although it would take her at least four hours to get here.

Sarah was lying in the bed's center, her head propped up by pillows. Don sat on the edge of the bed and held her hand, his smooth skin such a stark contrast with her wrinkled, loose skin.

"Hey," he said, softly.

She tilted her head slightly and let out a breath that hinted at being the same word in reply.

They were quiet for a time, then, softly, Sarah said, "We did all right, didn't we?"

"For sure," he replied. "Two great kids. You've been a wonderful mother." He squeezed her hand just a little harder; it looked so fragile, and bore bruises on its back from needles having been inserted there today. "And you've been a wonderful wife."

She smiled a little, but probably as much as her weakened state would allow. "And you were a won—"

He cut her off, unable to bear the words. "Sixty years," is what came out of his mouth, but that, too, he realized, was a reference to their marriage.

"When I'm . . ." Sarah paused, perhaps vacillating between saying "dead" and saying "gone," then opting for the latter: "When I'm gone, I don't want you to be too sad."

"I . . . don't think I'll be able to help it," he said softly.

She nodded almost imperceptibly. "But you've got what none of the rest of us ever had." She said it without remorse, without bitterness. "You were married for six decades, but have even more than that amount of time to get over . . . get over the loss of your spouse. Until now, no one who'd been married that long ever had that luxury."

"Decades won't be long enough," he said, his voice cracking slightly. "Centuries wouldn't be."

"I know," said Sarah, and she rotated her wrist so she could squeeze his hand, the dying woman comforting the living man. "But we were lucky to have so long together. Bill didn't have nearly that long with Pam."

Don had never believed in such nonsense, but he felt his brother's presence now, one ghost already hovering in this room, perhaps ready to conduct Sarah on her journey.

Sarah spoke again, although it was clearly an effort. "We were luckier than most."

He considered that for a moment. Maybe she was right. Despite everything, maybe she was right. What had he thought, back on the day of their sixtieth wedding anniversary, while waiting for the kids to show up? *It had been a good life*—and nothing that had happened since could erase that.

She was quiet for a time, just looking at him. At last, she shook her head slightly. "You look so much like you did when we first met, all those years ago."

He tilted his head dismissively. "I was fat then."

"But your . . ." She sought a word, found it: "Intensity. It's the same. It's all the same, and—" She winced, apparently feeling a knife-edge of pain, sharp enough to cut through the drugs Bonhoff had given her.

"Sarah!"

"I'm—" She stopped herself before giving voice to the lie that she was okay.

"I know it's been difficult for you," she said, "this last year." She paused, as if exhausted from speaking, and Don had nothing to fill the void with, so he simply waited until she had regained enough strength to continue: "I know that . . . that you couldn't possibly have wanted to be with someone so old, when you were so young."

His stomach was as tight as a prizefighter's fist. "I'm sorry," he said, almost in a whisper.

Whether she'd heard him, he couldn't say. But she managed a small smile. "Think about me from time to time. I don't—" she made a sound in her throat, but he perceived it as one of sadness, not a sign of further deterioration. "I don't want the only person thinking about me 18.8 years from now to be my pen pal on Sigma Draconis II."

"I promise," he said. "I'll be thinking about you constantly. I'll be thinking about you forever."

She made a weak smile again. "No one could do that," she said, very softly, "but of all the people I know in the world, you're the one who could come the closest."

And, with that, her hand went limp in his.

He let go of her hand and shook her ever so gently. "Sarah!"

But there was no reply.

Chapter 42

When morning came, Don and Emily—who had arrived around midnight, and had slept in her old room while Don slept on the couch—started making the requisite phone calls to family and friends. The fifteenth or twentieth one Don made was to Cody McGavin. Ms. Hashimoto put him through at once, after he told her why he was calling.

"Hello, Don," McGavin said. "What's up?"

Don said it simply, directly: "Sarah passed away last night."

"Oh, my . . . Oh, Don, I'm sorry."

"The funeral will be in three days, here in Toronto."

"Let me—no, damn it. I have to be in Borneo. I'm so sorry."

"That's okay," Don said.

"I, um, I hate to even mention this," McGavin said, "but, ah, you *do* have the decryption key, don't you?"

"Yes," replied Don.

"Good, good. Maybe you should give me a copy. You know, for backup."

"It's safe," Don said. "Don't worry."

"It's just that—"

"Anyway," said Don, "I've got to make a lot more calls, but I thought you'd want to know."

"I do appreciate it, Don. And, again, my condolences."

When the call had come from McGavin Robotics, saying it was time for his Mozo's routine-maintenance service check, Don had resisted the urge to put it off. "Fine," he said. "What time will you be here?"

"Whenever you like," the male voice had said.

"Don't you have to schedule these things weeks in advance?"

The person at the other end of the line chuckled. "Not for Mr. McGavin's priority customers."

The dark-blue van had shown up punctually at 11:00 A.M., just as Don had requested. A dapper little black man of about forty-five came to the door, carrying a small aluminum equipment case. "Mr. Halifax?" he said.

"That's right."

"My name's Albert. Sorry to be a bother. We like to tune things up periodically. You understand—better to nip problems in the bud than to let a major systems failure occur."

"Sure," said Don. "Come in."

"Where is your Mozo?" Albert asked.

"Upstairs, I think." Don led him up to the living room, then said loudly, "Gunter!"

Normally, Gunter appeared in a flash—Jeeves on steroids. But this time he didn't, so Don actually yelled the name. "Gunter! Gunter!" When there was still no response, Don looked at the roboticist, feeling a bit embarrassed, as though a child of Don's was misbehaving in front of guests. "Sorry."

"Could he be out back?" Albert asked.

"Maybe. But he knew you were coming . . ."

Don ascended the big staircase, Albert following him. They looked in the study, in the bedroom, in the *en suite* bathroom, in the other bathroom, and in what had been Emily's old room. But there was no sign of Gunter. Going downstairs, they checked the kitchen and the dining room. Nothing. Then they headed to the basement, and—

"Oh, God!" said Don, sprinting to the fallen Mozo. Gunter was sprawled face down in the middle of the floor.

The roboticist ran over, too, and kneeled. "His power's off," he said.

"We never turn him off," said Don. "Could his battery have failed?"

"After less than a year?" Albert said, as if Don had suggested an absurdity. "Not likely."

The roboticist rolled Gunter over onto his back. *"Shit,"* he said. There was a small panel open in the center of Gunter's chest. Albert took a penlight from his breast pocket and shone it within. "Damn, damn, damn . . ."

"What is it?" asked Don. "What's wrong?" He peered into the opening. "What are those controls for?"

"They're the master mnemonic registers," Albert replied. He reached below the open panel, to Gunter's recessed on/off switch, located right where a navel would have been, and he gave the switch a firm push.

"Hello," said the familiar voice, as the mouth outline twitched into life. "Do you speak English? *Hola. ¿Habla Español? Bonjour. Parlez-vous Français? Konichi-wa. Nihongo-o hanashimasu-ka?"*

"What is this?" said Don. "What's happening?"

"English," Albert said to the robot.

"Hello," said the Mozo again. "This is the first time I've been activated since leaving the factory, so I need to ask you a few questions, please. First, from whom do I take instructions?"

"What's he talking about?" said Don. "'First time.' What's with that?"

"He's done a system restore," Albert said, shaking his head slowly back and forth.

"What?"

"He's wiped his own memory, and reset everything to its factory-default state."

"Why?"

"I don't know. I've never seen one do that before."

"Gunter . . ." said Don, looking into the two, round glassy eyes.

"Which of you is Gunter?" replied the robot.

"No," said Don. *"You're* Gunter. That's your name."

"Is that G-U-N-T-H-E-R?" asked the machine.

Don felt his stomach knotting. "He's—he's gone, isn't he?"

The man nodded.

"No way to bring him back?"

"I'm sorry, no. It's a total wipe."

"But—" And then Don got it. It had taken him longer than it had taken Gunter, but he got it. The only—the only *person* who had been with Sarah when she'd unlocked the Dracon message had been Gunter. This technician hadn't come here to give the Mozo a tune-up. He'd come to tap into Gunter's memories, to steal the decryption key for McGavin. The rich man had wanted to control everything—and with the decryption key he could, taking over the creating of the Dracon children himself and cutting Don right out of the process.

"Get out," Don said to the roboticist.

"Excuse me?"

Don was furious. "Get the hell out of my house."

"Mr. Halifax, I—"

"Do you think I don't know what you were sent here to do? Get out."

"Honestly, Mr. Halifax—"

"Now!"

Albert looked frightened; Don was physically twenty years younger than him and six inches taller. He grabbed his aluminum case and hurried up the stairs, while Don gingerly helped Gunter get back on his feet.

Don knew what must have happened. After he'd called McGavin to tell him that Sarah had passed on, McGavin had thought back to the last time he'd seen Sarah, and, in replaying it in his mind, he must have realized that Gunter would have seen Sarah apply the decryption key, and so probably knew what it was.

Don was livid as he told his phone to call McGavin again. After two rings, a voice he knew answered. "McGavin Industries. Office of the president."

"Hello, Ms. Hashimoto. It's Donald Halifax. I'd like to speak to Mr. McGavin."

"I'm sorry, but he's not available right now."

Don spoke with controlled rage. "Please take a message. Tell him I need to hear back from him today."

"I can't commit to when Mr. McGavin might return any given call, and—"

"Just give him the message," Don said.

Don's phone rang two hours later. "Hi, Don. Ms. Hashimoto said you called—"

"If you ever try a stunt like that again, I swear I'll cut you completely out," Don said. "Jesus, we thought we could trust you!"

"I don't know what you're talking about."

"Don't play games. I know what you were trying to do with Gunter."

"I'm not—"

"Don't deny it."

"I think you should take a deep breath, Don. I know you've been through a lot—"

"You're damn right I have. They say people aren't really gone, so long as we remember them. But now one of those who remembered Sarah *perfectly* is gone."

Silence.

"Damn it, Cody! We can't do this if I can't trust you."

"That robot is *mine,"* McGavin said. "He's on loan from my company—so everything in his memories is *my* property."

"There's nothing in his memories now," snapped Don.

"I—I know," said McGavin. "I'm sorry. If I'd thought for one second that he'd—" Silence for a time, then: "No robot has ever done that before."

"You could take a lesson from him," said Don, sharply. "A lesson in loyalty."

McGavin's tone grew stiff; doubtless he was almost never spoken to like this. "Well, since the Mozo was loaned to Sarah, to help her, maybe I should—"

Don felt his pulse racing. "No, please—don't take him back. I . . ."

McGavin still sounded angry. "What?"

Don shrugged a little, although there was no way McGavin could see it. "He's family."

A long pause, then an audible intake of breath. "All right," said McGavin. "If it'll make things right between us, you can keep him."

Silence.

"Are we okay, Don?"

Don was still furious. If he'd really been twenty-six, he might have continued fighting. But he wasn't; he knew when to back down. "Yeah."

"All right." McGavin's tone slowly regained its warmth. "Because we're making good initial progress on the artificial womb, but, God, it's tough. Every part has to be machined from scratch, and there are technologies involved my engineers have never seen before . . ."

Don looked around the living room. The mantel now had dozens of sympathy cards on it, each one dutifully printed out and folded by Gunter. Don lamented the death of paper mail, but he supposed sending streams of data that could be reconstituted by the recipient *was* appropriate under the circumstances.

One of the sympathy cards was propped up by the trophy the IAU had given Sarah. Another was leaning against Don and Sarah's wedding photo in a way that covered the image of Don. He walked over to the mantel, moved that card, and looked at Sarah as she had been, and at himself, back when he'd been in his twenties the first time around.

There were flowers, too, both real and virtual. A vase of roses sat on the little table between the couch and the La-Z-Boy; a projection of pink carnations hovered above the coffee table. He remembered how much Sarah had enjoyed planting flowers in her youth, how she still gardened well into her seventies, how she'd once described the Very Large Array as looking like God's flower bed.

As he looked at the cards some more, Don became conscious of movement out of the corner of his eye. He turned and beheld the round blue face of Gunter.

"I'm sorry that your wife is gone," the robot said, and its emoticon line was turned downward at the ends in a way that might have been comical in other circumstances but just now seemed touchingly genuine.

Don regarded the machine. "Me too," he said softly.

"I hope it was not presumptuous," said the robot, "but I have read what is written in these cards." He tilted his head at the mantel. "She sounds like a remarkable woman."

"That she was," Don said. He didn't enumerate them out loud, but the categories ran through his head: wife, mother, friend, teacher, scientist, and, earlier, daughter and sister. So many roles, and she'd filled them all well.

"If I may ask, what did people say about her at the funeral?"

"I'll show you the footage later."

Footage. The word echoed in Don's head. No one used the term anymore. It referred to an obsolete technology and a measuring system that had all but passed out of living memory.

"Thank you," said Gunter. "I wish I had known her."

Don looked at the unblinking glass eyes for a time. "I'm going to go to the cemetery tomorrow," he said. "Would—would you like to come with me?"

The Mozo nodded. "Yes. I would like that very much."

York Cemetery's northern border was marked by the back fences of the houses on Park Home Avenue, and Park Home was just one block south of Betty Ann Drive, so Don and Gunter simply walked there. Don wondered if any of his neighbors were watching them through their windows, or zooming in on them with their security cameras: the robot and the rollback, two miracles of modern science, marching along, side by side.

After a few minutes, they reached the gated entrance. When Sarah and he had bought their house, its proximity to a cemetery had depressed its value. Now it was seen as a plus, since green spaces of any type were so rare these days. And, fortunately, they'd bought the plot here early on; they'd never have been able to afford the luxury of interment today.

Don and Gunter had to walk along a path for several hundred meters to get to where Sarah was buried. Gunter was looking around with what Don could have sworn were wide eyes. Tested in a factory, and then used exclusively inside a house since his memory wipe, the robot had never seen so many trees and such wide expanses of manicured lawns.

At last they came to the spot. The hole had been filled in, and new sod covered the grave, a scar of dirt outlining it.

Don looked over at the robot, who, in turn was looking toward the headstone. "The inscription is off-center," Gunter said. Don turned to it. Sarah's name and details were confined to the right half of the oblong block of granite.

"I'll be buried here, too," said Don. *Eventually.* "My information will be added on the other side."

Sarah's half said:

Sarah Donna Enright Halifax
Beloved wife and mother
29 May 1960–20 November 2048
She talked to the stars

Don looked at the blankness onto which his own dates would someday be written. The death year would likely start with a two and a one, he supposed: Nineteen-Sixty to Twenty-One-something. His poor, darling Sarah would likely lie here alone for the better part of a century.

He felt a tightness in his chest. He hadn't cried much at the funeral. The strain of greeting so many people, the rushing to and fro—he'd endured it all in a state of near shock, he supposed, ferried about by Emily.

But now there was no more rushing around. Now, he was alone except for Gunter, and he was exhausted, emotionally and physically.

He looked again at the headstone, the letters blurring.

Beloved wife.

Beloved mother.

The tears started coming in force, streaming down his too-smooth cheeks, and, after valiantly trying to stay standing on his own for maybe half a minute, Don collapsed against Gunter. And whether it was a behavior he'd been programmed with, or whether it was something he'd seen on TV, or whether it had just spontaneously emerged didn't really matter, but Don could feel the flat of Gunter's hand patting him gently, soothingly, in the center of his back as the robot held him.

Chapter 43

Don remembered wondering whether time would pass quickly or slowly for him now that he was young again. One possibility was that years might crawl by the way they had in his actual youth, each one seeming to take forever to run its course.

But that wasn't what happened. Before Don knew it, more than a full year had slipped by: the calendar freshly read 2050, and he was twenty-seven and he was also eighty-nine.

But, even if its passage had seemed rapid, that year did change things, although he did still find himself often just staring into space, thinking about Sarah and—

And—

No. Just about Sarah; only about Sarah. He knew she was the only one who should be in his thoughts, although—

Although Lenore doubtless knew that Sarah had died. For the first few weeks after her passing, Don had assumed he'd hear something from her. In a previous age, she might have sent a consolatory telegram or a paper card, neither of which would have invited dialogue, neither of which would have required a response. But these days Lenore's only real options would have been to phone, which certainly would have engendered a conversation, or to send an email, which netiquette would have required Don to reply to.

But as first one month and then another passed, Don realized she wasn't going to be in touch—which, he supposed, might have been just as well, for what could she have said? That she was sorry that Sarah was dead? And yet, wouldn't there have been, between the lines, too horrible to acknowledge directly but impossible to dismiss from consciousness, a concomitant thought that she was sorry Sarah hadn't died sooner? Not out of any animus but simply in recognition of the fact that Sarah's existence was what had ultimately kept Lenore and Don apart?

Every few weeks, he searched the web, looking at references to Sarah. There was so much about her, and even though most of it was quite old, it made it seem, in a strange way, like she was still around.

He never googled himself anymore, though. There was, as Randy Trenholm had said, lots of discussion of the peculiar circumstances of his rollback, and he found reading it made his stomach turn. But every now and then he did put in Lenore's name, to see what would come up. She had indeed finished her master's, and, as she'd said she'd hoped to, had now moved to Christchurch, and was working there on her doctorate.

He looked at whatever his searches found: references to her on the University of Canterbury website, citations of a paper she was junior author on, her occasional postings to political newsgroups, and video of her on a panel discussion at a conference in Tokyo. He watched the clip over and over again.

He would never get over the loss of Sarah; he knew that. But he *did* have to get on with life, and soon enough that life would change totally and completely, in ways he couldn't begin to guess. McGavin said the womb should be ready in a matter of weeks now. Of course, the gestation would take a while—seven months, according to the message the Dracons had sent.

Lenore had been out of his life for almost a year and a half now. It was too much to hope that she might still be free. And, even if she were free, maybe the whole *episode* (that was the word she'd use) was something she wanted to put behind her, anyway: the insane time during which she'd fallen for what she'd thought was a contemporary, only to discover to her shock and disgust that he was—that hated term again—an octogenarian.

And yet . . .

And yet, in the end, she seemed to have more or less come to terms with the reality of what he was, accepting his dual ages, his youthful exterior and his less-youthful interior. It would be a miracle to find someone else who could deal with that, and although this *was* the age of miracle and wonder, Don didn't believe in *that* kind of miracle.

Of course, he thought, a sensible man would contact Lenore by phone or email. A sensible man wouldn't fly halfway around the planet in the faint hope that he'd be greeted with open arms. But he wasn't a sensible man; he was a supremely silly one—both the women he'd loved had told him that.

And so . . .

And so, here he was, on a flight to New Zealand. As he took his seat on the plane, he realized he had a real advantage over the aliens on Sigma Draconis. The Dracons could only broadcast their messages into the darkness, and, unless a reply was sent back, they'd never even know if their signals had been received, and then not for years to come. He at least would see Lenore's face—and, he expected, that *was* all he'd need to see: the message it contained when she first laid eyes on him would be unguarded and honest, an unencrypted signal. And yet, what he'd give to know the answer now . . .

By that Heaven that bends above us—
by that God we both adore—
Tell this soul with sorrow laden if,
within the distant Aidenn,
It shall clasp a sainted maiden
whom the angels named Lenore

Don had ended up with a window seat. That was perhaps a plum position on a domestic flight, but when one wanted to get up frequently to stretch one's legs, it meant disturbing, in this case, not one but two fellow passengers, one of whom, the one with the middle seat, adjacent to Don's, was a man of at least seventy-five. Don all too vividly remembered what it was like to try to haul himself to his feet, especially in a cramped, awkward space, at such an age, and so he mostly endured being trapped, alternating between looking out at the endless vistas of cloud tops and watching a succession of programs on his seat-back monitor.

About four hours into the flight the old man next to him struck up a conversation. "God eye," he said—and, after a moment, Don's brain decoded it as "Good day" filtered through an Australian accent. "Name's Roger." He must be heading home, Don presumed; this flight would continue on to Melbourne after its stop in Auckland, where Don himself would change planes for Christchurch.

"What were you doing in Toronto?" asked Don, after they had confirmed Roger's pedigree in conversation.

"Actually, I was in Huntsville," Roger said. "You know it?"

"Sure," said Don. "Cottage country."

"Bingo. My daughter lives there. Runs a B & B. And she just had a baby girl, so I had to go see."

Don smiled. "Grandkids are great."

Roger looked at him quizzically, but then nodded and said, "That they are, mate."

"Have you been to Canada before?" Don asked.

"This was my fourth trip, but . . ." His face, so full of delight when he mentioned his new granddaughter, now looked sad, and Don thought he was perhaps going to say it was likely to be his last time. But what he actually said was, "It was my first time going on my own. My wife passed away last year."

Don's heart skipped a beat. "I'm sorry."

"Thanks. A wonderful woman, my Kelly was."

"I'm sure. How long were you married?"

"Fifty years. Fifty years and one week, actually. It was like she'd been holding on, wanting to make that milestone."

Don said nothing.

"I miss her so much," Roger said. "I miss her every day."

Don just listened as Roger talked about his wife, and the fine times they'd had together, and he resisted the almost overwhelming urge to say, "I know," or "Same here," or "That's just the way it was with Sarah and me."

Finally, though, Roger looked at him with an embarrassed expression. "Sorry," he said. "I guess I've been rambling. You'll have to forgive an old geezer."

"Not at all," said Don.

Roger smiled. He had a roundish head and very little hair, and the rough skin of a man who'd enjoyed being out in the sun much of his life. "You're a fine young bloke, listening to me go on like that."

Don found he had to suppress a grin. "Thanks."

"So, mate, what's your story? Why are you going to Oz?"

"Actually, I'm not. I'm heading to New Zealand."

"North Island or South?"

"South."

"Well, they're both lovely. Lots of sheep, though."

This time Don didn't suppress his grin. Still, he couldn't say he'd been there almost sixty years ago, and he didn't know enough contemporary details to speak convincingly of a more-recent trip, so he simply said, "So I hear."

"What's bringing you to Kiwi-land? Business or pleasure?"

"Honestly? I'm chasing after a girl."

To his surprise, Roger slapped him on the knee. "Good on you, mate! Good on you!"

"Maybe," said Don. "Maybe not. We broke up over a year ago. She went to Christchurch to study. But I've missed her more than I can say."

"She knows you're coming, though, right?"

Don shook his head and steeled himself for being told he was being foolish.

Roger lifted his eyebrows. "Can you stand a spot of advice from an old man?"

"Best kind I know," Don said.

Roger tilted his head; he'd presumably expected an attempt to deflect his input. But then he nodded sagely. "You're doing the right thing. The only regrets I have are over the mad, impetuous things I *didn't* do."

Don smiled. "You are a very wise man."

Roger chuckled. "Live long enough and you'll be one, too."

Chapter 44

After changing planes, Don finally made it to the airport in Christchurch around 5:00 A.M. local time. He hated having to pay for a night's hotel when he wasn't checking in until almost dawn, but the alternative would be trying to rendezvous with Lenore in a disheveled, wild-eyed, sleep-deprived state, and he felt enough like a crazy person doing this already.

He'd booked the cheapest hotel he could find online, and took a taxi over to it. His room was small by North American standards but it had a little balcony. After he'd washed up a bit, he stepped out onto it. Even though it was summer here, he could see his own breath in the crisp early morning air.

Almost all the lights were off in the surrounding buildings. He went back into his room for a moment and killed the lights there, then returned to the balcony and let his tired eyes adjust to the dimness.

You can't be married to an astronomer for sixty years without learning some constellations, but Don saw almost nothing familiar in this moonless sky, although there were two stars brighter than all the others. Alpha Centauri and Beta Centauri—just about all he could remember from his brief trip here all those years ago, except . . .

He scanned about, and—yes, there they were, impossibly large: the Clouds of Magellan, two smudges against the darkness. He stood there for a time, shivering, looking at them.

By and by, the sun started to come up, the horizon growing pink, and—

And suddenly there was a cacophony of bird songs: trills and tweets unlike any he ever heard back in Canada. An unfamiliar sky, bizarre background sounds: he might as well be on an alien world.

He went back inside, set an alarm for five hours hence, lay down, and closed his eyes, wondering what the new day would hold.

When Don got up, he used his datacom to check his email. There was the usual daily progress report from Cody McGavin: all was going well with fabricating the womb. The alien DNA sequences had now been synthesized, too, done in bits and pieces at four separate commercial labs, then reassembled through a version of the whole-genome shotgun technique that had been used half a century earlier to make the first map of the *Homo sapiens* genome. Soon, McGavin said, everything would be ready to start growing the embryos.

Don had thought about trying to intercept Lenore as she was leaving from or arriving at her flat; it had been easy enough to find out where she lived. But some might view what he was doing as the ultimate act of stalking; she might be quite disconcerted if he showed up unannounced there. Besides, for all he knew, she was living with someone, and he didn't want a confrontation with a jealous boyfriend.

And so he decided to go see her at the university. It took nothing but a few questions asked of his datacom to reveal the astronomy grad-student colloquium schedule. Before leaving the hotel, he got a little money from the cash machine in the lobby; Don remembered all the predictions of a cashless society, but that, too, had failed to pan out, mostly because of concerns over privacy. Although he received crisp new bills, a much younger version of King William appeared on them than Don was used to from the banknotes back home; it was as though His Royal Highness had had a little rollback of his own down here.

The robot-driven taxi let him off at the entrance to the campus, by a big sign:

Nau mai, haere mai ki
te Whare Wananga o Waitaha

Strange words, alien text. But a Rosetta stone was provided as a matching sign on the opposite side of the roadway:

Welcome
to the
University of Canterbury

A river ran through the campus, and he walked along one of its banks toward the building a passerby told him housed the astronomy department, a new-looking red-brick affair half-sunk into a hillside. Once he got inside, he started looking for the right room, although he had trouble figuring out the sequence of room numbers.

He stumbled upon the astronomy-department office and stuck his head in the door. There was a Maori man of about thirty at a desk, his face covered by intricate tattoos. "Hi," said Don. "Can you please tell me where room 42-214B is?"

"Looking for Lenore Darby?" asked the man.

Moths danced a ballet in Don's stomach. "Um, yes."

The man smiled. "Thought so. You've got a Canadian accent. Anyway, go down the hall, turn right at the next corridor, and it'll be on your left."

Don had twenty minutes until the colloquium would be over. He thanked the man, then made a pit stop in a washroom, and checked for anything in his teeth, fixed his hair, and straightened his clothes. And then he headed to the classroom. The door was closed, but it had a little window and he chanced a peek through it.

His heart jumped. There was Lenore, standing at the front of the room; apparently it was her turn to present to the colloquium. As if to underscore that time had passed and many things might be different, he noted that she'd cut her red hair much shorter than he was used to seeing it. And she looked older, although she was still in that range of years during which that meant more grown up, not more decrepit.

The room was a small lecture theater, with a steep bank of chairs facing a central stage. There was a podium, but Lenore wasn't hiding behind it. Instead she stood confidently, in full view, in the middle of the stage. Perhaps a dozen other people were in the room. All he could see of them were the backs of their heads. Some had gray hair; presumably they were faculty members. Lenore was using a laser pointer to indicate things within a complex graphic on the room's front wall screen. He couldn't make out what she was saying, but the squeak was unmistakable.

Don sat on the floor beside the door, waiting for the session to end. He felt a surge of adrenaline when the door swung open—but it was only some guy wearing an All Blacks T-shirt stepping out to use the washroom.

Finally other classrooms along the same hallway started opening, but the door to Lenore's room remained maddeningly shut. Don got up off the floor and dusted off the seat of his pants. He was just about to look through the window when the door swung open again. He stepped to one side, the way people used to with subway doors in Toronto.

When there was a lull, he looked into the room again. Lenore was down at the front, her back to him, talking with the final remaining person, a slim young man. Don watched until, at last, the man nodded and started walking up the stairs. Lenore, meanwhile, was doing something at the podium.

Don took a deep breath, hoping it would calm him, and he went through the door. He got only four steps down before Lenore looked up, and—

—and her eyes went wide, almost fully circular, and her mouth dropped open, forming another circle, and he continued down, feeling shakier than he'd ever felt even before the rollback.

She clearly couldn't believe what she was seeing, and she looked as though she was trying to convince herself that this was someone who just happened to bear a strong resemblance to Don. It had been a long time since she'd seen him, after all, and—

"Don?" she said at last.

He smiled, but could feel the corners of his mouth quivering. "Hello, Lenore."

"Don!" She practically shouted the name, and a giant grin grew across her face.

He found himself running down the remaining stairs, and she was coming up them, taking two in each stride, and suddenly they were in each other's arms. He so desperately wanted to kiss her—but just because he was being greeted like an old friend didn't mean she'd welcome that.

After all too brief a time, he felt her pulling away. She looked at him, her eyes flicking back and forth, staring first at his left eye, then his right. "What *are* you doing here?"

"I—I hope you don't mind."

"Mind?" she said.

"I didn't know whether you'd be happy to see me."

"Of course I'm happy! Are you taking a vacation down here?"

He shook his head. "I came just to see you."

She looked thunderstruck. "My . . . God. You should have called."

"I know. I'm sorry."

"No, no. Don't be sorry, but . . ." She paused. "All this way just to see me?"

He nodded.

"My God," she said again. But then she tilted her chin down a bit. "I was so sorry to hear about Sarah. When was that? Four or five months ago?"

"Over a year," said Don, simply.

"I'm so sorry," she said. "I—I'm just so sorry."

"Me, too."

"And now," she said, a shift in her tone indicating that the enormity of the situation had struck her, "you're here."

"Yes." He didn't know how to ask his next question politely, or how to segue to it elegantly, so he just blurted it out. "Are you seeing anyone?"

She looked at him a moment longer, and it was clear that she understood the import of the question, and also understood that she'd been offered an out: she could simply respond in the affirmative and not have to deal further with him. "No," she said, firmly if squeakily. "No one."

He felt air rushing out of him, and he pulled her close again. "Thank God," he said. He hesitated for a second, then gently tilted her face up, and kissed her—and, to his delight, she kissed him back.

Suddenly there was a loud sound, and another, and another. He turned his head and looked up, and—

And there, standing at the top of the stairs, were a handful of students, waiting to come into the room, and one of them had started to applaud, a big grin on his face. The others joined him, and Don felt an even bigger grin splitting his own features, and he looked at Lenore, whose skin had turned bright red.

"If you'll excuse us," Don said, and he took Lenore's hand, and the two of them began walking up the stairs, and the students started coming down, passing them, and one of them slapped Don on the shoulder as he went by.

* * *

Lenore and Don headed out into the warm midday air, which was a wonderful contrast to the Canadian winter he'd left behind. There was so much he wanted to tell her, and yet he found it impossible to begin. At last, though, he said, "I like your hair that way."

"Thanks," said Lenore, still holding his hand. They were walking along the banks of the little river, which Lenore said was called the Avon; it made a pleasing background sound. On the opposite side of it were campus buildings and a car park. The pathway was paved, and there were trees of types Don couldn't name on its margin. Lenore nodded occasionally to passing students or faculty members.

"So, what are you doing now?" she asked. A couple of birds with black bodies, long curving bills, and orange cheek patches hopped out of their way. "Have—have you found a job?" She said it gently, knowing that the issue was a delicate one.

Don stopped walking, and Lenore stopped, too. He let go of her hand and looked into her eyes. "I want to tell you something," he said, "but I need you to promise to keep it a secret."

"Of course," she said.

He nodded. He trusted her completely. "Sarah decrypted the message."

Lenore's eyes narrowed. "That can't be," she said. "I'd have heard . . ."

"It was a *private* message."

She looked at him, brow knitted.

"I'm serious," he said. "It was private, for the person whose survey answers the Dracons found most to their liking."

"And that was Sarah?"

"That was my Sarah, yes."

"So what did the message say?"

Two students were running toward them, obviously late for class. Don waited until they passed. "They sent their genome, and the instructions for all the supporting hardware needed to create two Dracon children."

"My . . . God. Are you serious?"

"Absolutely. Cody McGavin is involved in the project. And so am I. I'm going to be the . . ." He paused, even now still somewhat amazed at the notion. ". . . the foster father. But I'll need help raising the Dracon children."

She looked at him blankly.

"And, well, I want you back in my life. I want you in the children's lives."

"Me?"

"Yes, you."

She looked stunned. "I, um, I mean, you and me—that's one thing, and I . . ."

Don's heart was pounding. "Yes?"

She smiled that radiant smile of hers. "And I *have* missed you so. But . . . but this stuff about raising—my God, the very idea!—about raising Dracon children. I—I'm hardly qualified for that."

"No one is. But you're a SETI researcher; that's as good a background as any to start with."

"But I'm years away from finishing my Ph.D."

"Have you picked a thesis topic?" he said. "'Cause I've got a doozy . . ."

She looked stunned, but then she frowned. "But I'm down here, in New Zealand. Presumably you're planning to do this in North America."

"Don't worry about that. When we go public with this—and we will, just as soon as the children are born—every university on the planet will want a piece of it. I'm sure arrangements can easily be made with the administration here so that your degree won't be jeopardized."

"I don't know what to say. I mean, this is—it's almost too much to take in."

"Tell me about it," said Don.

"Dracon children," she said again, shaking her head. "It would be an amazing experience, but there are tenured profs who—"

"This isn't about credentials; it's about *character*. The aliens didn't ask the survey respondents to rank themselves socioeconomically or to indicate how much education they had. They asked about their morals, their ethics."

"But I never took the survey," she

said.

"No, but I did. And I'm a pretty darn good judge of character myself. So what do you say?"

"I'm—overwhelmed."

"And intrigued?"

"God, yes. But talk about bringing baggage into a relationship! You've got kids, grandkids—and you're going to have . . . um . . ."

"Sarah called them 'Draclings.'"

"Awww! So cute! Still, kids, grandkids, and Draclings . . ."

"And the robot—don't forget I've got a robot."

She shook her head, but was smiling as she did so. "What a family!"

He smiled back at her. "Hey, this is the Fifties. Get with the times."

She nodded. "Oh, I'm sure it'll be great. But it's not—you know—not *complete.* The family, I mean. I'll want to have a child or two of my own."

"Oooh! More presents on Father's Day!"

"If you're the father . . ." She looked at him. "Is that . . . is that something you're interested in doing?"

"I think so, yes. If the right woman comes along . . ."

She whapped him on the arm.

"Seriously," he said, "I'd be thrilled. Besides, the Draclings will need playmates."

She smiled, but then her eyes went wide. "But our kids will be—my God, they'll be younger than your grandkids . . ." She shook her head. "I don't think I'll ever get used to all this."

Don took her hand. "Of course you will, darling. Just give it time."

Epilogue
October 2067

"Come on, everyone! Let's go!"

Don had pulled the big van up to the edge of the large concrete plaza in front of the docks. Hundreds of tourists were milling about, either waiting to get on one of the high-speed ferries, or, like Don's family, having just gotten off one. The plaza was ringed by vendors selling T-shirts, hot dogs, and more. Lenore was standing near the barrier that prevented Don from bringing the van any closer. "You heard your father!" she called. "We want to get there while the sun's still up."

Don couldn't blame them for dawdling. This spot, at the foot of Hurontario Street, was the only place they'd been from which one could get a good view of the entire fairgrounds, sprawling across two artificial islands out in Lake Ontario. The American pavilion was a gigantic diamond—quite literally—and the Chinese pavilion honored both its nation's culture and Earth's most famous nonhuman citizens by being built in the shape of a rampant dragon whose body curved and twisted to match the one depicted by the constellation of Draco. Rising between them was the glistening carbon-nanotube Spire of Hope, which had brought back to Toronto the title of being home to the world's tallest building.

Don was used to his sons' three-legged walk, but the tourists who had been discreetly watching them now gawked openly at the surprisingly graceful spectacle of them in motion. His daughter, though, was standing still. Fifteen-year-old Gillian, who had her mother's freckles but her father's sandy brown hair, was one place from the head of the line for a cotton-candy vendor. She looked at her dad with an anxious expression, wondering if she'd have to bail before securing her treat.

"It's okay," Don called out. "But hurry!"

He and Lenore had done their best raising Gillian, and Don had been pleased to find how relaxing it had been to be a parent the second time around; with the quiet confidence of experience, he'd had a much better handle on what were genuine crises and which things would pass of their own accord.

The boys, who, at two and a half meters tall and two hundred kilos apiece, had no trouble making their way through the crowd, had also turned out all right. They'd been raised alongside Gillian in a house Cody McGavin had paid for—in Winnipeg, as it happened, since prudence suggested that it be somewhere near a Level-Four Biohazard Containment Lab, and the one there was the only one in North America designed to handle livestock and other large lifeforms. Hundreds of experts watched the goings-on in the house through webcams, and provided what advice they could. But Don and Lenore were the boys' parents, and ultimately, as all parents did, they went with their best instincts.

Don touched the control that opened the rear passenger compartment. The van—the Dracmobile, as the press had dubbed it—had a high enough roof to accommodate the boys, neither of whom could sit; their two front legs and thick hind leg weren't built for that. Once they were in, Don sealed the compartment, and let the carbon-dioxide scrubbers get to work. By the time Gillian had arrived, gingerly carrying her giant ball of pink cotton candy, the green light on the dashboard had gone on, and the boys had removed their filter masks.

Don had never thought he'd own such a big van, but, then again, the days of worrying about gas mileage were long since gone. It had taken a while, but he'd finally gotten tired of intoning, as Robin had in the 1960s *Batman* series, "Atomic batteries to power! Turbines to speed!" whenever he climbed in. Lenore got into the front passenger seat, and Gillian and Gunter—the Gees, as they were collectively referred to in the Halifax-Darby household—piled into the second row of seats.

"When does the ceremony start tonight?" Don asked.

"Nine o'clock," Gunter supplied.

"Perfect," he said, pulling away from the curb. "Plenty of time." He could have let the Mozo do the driving, but, gosh darn it, driving your whole family around in the big old family vehicle was one of the joys of fatherhood.

"So," said Lenore, looking back over her shoulder, "everybody having a good time so far?"

"Oh, yeah!" said Amphion, and his crests rippled enthusiastically. "Terrific!" The boys had no trouble making the sounds for English; they had a much wider vocal range than humans did. But despite the best possible language instruction, they seemed constitutionally incapable of using the passive voice. Some opined that this was the seat of Dracon morality: the inability to conceive of an action having occurred without a responsible party.

"I thought the utility-fog demo was amazing," added Zethus. A contest had been held to name the Draclings when they were born; the winning entry had been Amphion and Zethus, after the twin sons of Zeus who had been raised on Earth by foster parents.

Don nodded. The nanotech fog had been incredible to watch, but for him the most exciting thing had been the flying cars—a technology he'd finally lived long enough to see.

Canada had turned two hundred this past summer, and it was celebrating this centennial the same way it had the last one: by hosting a world's fair. Don remembered visiting the first one as a child with his parents, and being amazed by giant lasers, touch-tone phones, monorails, and a massive geodesic sphere filled with American space capsules. That fair, like this one, had been called Expo 67, with only a two-digit year; just two-thirds of a century into the new millennium and the lessons old Peter de Jager had tried to teach the world were totally forgotten. But, also like the original, this fair was at least in part a showcase for the latest and greatest technology, some of which had been derived from the artificial womb and incubator plans the Dracons had beamed to Earth.

Don pulled the van into traffic. A few other drivers honked politely and waved; Amphion and Zethus were famous, the hulking green Dracmobile was unmistakable—and the Manitoba vanity plate that said STARKIDS didn't hurt.

Don had been six years old when Canada had turned one hundred in 1967. Back then, the government had contacted people who were born the same year the nation was, and arranged for school visits by those who were well enough. Even after all this time, Don vividly remembered meeting his very first centenarian then, an impossibly ancient man confined to a wheelchair.

But now a hundred more years had passed, and Don himself was a centenarian; in fact, he was a hundred and six, and soon would turn a hundred and seven. People younger than him—men and women born in 1967—were touring schools now, among them Pamela Anderson. She'd been the first baby born in her hometown in British Columbia on the actual day of Canada's hundredth birthday, and her own rollback, performed just a few years ago when the price had fallen enough that mere TV stars could afford it, had left her as lovely as when she'd first graced the pages of *Playboy*.

Don no longer looked that young; physically, he was now forty-four or so. His hair was mostly gone again, but that was fine with him. He was feeling better this time around than when he'd gone through his forties originally; it had been six decades since he'd had his one and only heart attack.

Lenore also was in her mid-forties—but doubtless not middle-aged. The cost of rolling back would continue to drop; seven million people had already undergone the procedure. By the time she needed it, they'd be able to pay for a rollback for her, and—the thought was staggering, but doubtless true—they'd be able to afford a *second* rollback for Don.

As they drove along, Amphion and Gillian were bickering, while Zethus was just looking out the window at the crowded streets of Toronto. Despite being named for twins, the Draclings had grown up to be distinct individuals. Amphion had blue-black skin and two small fluted crests running down the back of his head, while Zethus had teal and silver skin and three crests. Each boy was distinct in character, too. Amphion was adventurous and outgoing, and incapable of letting even the smallest irony go unremarked upon, while Zethus was cautious and shy with strangers but enjoyed word games almost as much as his father did.

Don looked at them in his rearview mirror. "Amphion," he said, "stop teasing your sister."

Amphion swiveled two of his four eyes to look at Don. "She started it!" Each Dracon eye had a unique visual range: two saw to varying degrees into the ultraviolet, the third saw into the infrared, and the fourth saw into both but not in color; the combination of eyes the boys chose to bring to bear on an object not only affected what it looked like to them but also how they felt about it. They also possessed a sense that had no terrestrial analog, enabling them to detect heavy objects even when they were out of view.

Amphion and Zethus each had five limbs: three legs and two arms. If their embryonic development was a reliable echoing of their evolutionary history, the two front legs had evolved from what had been pelvic fins in an earlier aquatic form, and the thicker rear leg was derived from what had been a tail fin. The arms, meanwhile, had developed not from pectoral fins, as in humans, but rather from the complex array of bones that had supported two ancestral gills.

Dracons had only three fingers on each of their two hands, but they nonetheless came honestly by the base-ten counting system used in their radio messages. The boys each had ten feeding tendrils around their mouth slits—two pairs of them above and a row of six below; Zethus was using his tendrils just now to maneuver a hunk of cotton candy that Gillian had passed through a small airlock to him. Because their four eyes were recessed in bony sockets, Dracons couldn't actually see their own tendrils, so whatever help they were in math involved some mental picture of their deployment, rather than actually counting them.

The original Expo 67 had been subtitled, in phrasing that seemed horribly sexist only a few years later, "Man And His World." This Expo 67 had no subtitle that Don was aware of, but "Humanity And Its Worlds" might have been appropriate: people had finally returned to the Moon, and a small international colony had been established on Mars.

And, of course, there were other worlds, too, although they didn't belong to humanity. As the timing would have it, it was now 18.8 years since Sarah Halifax had sent her final message to the stars, acknowledging receipt of the Dracon genome and explaining that her designated successor would help create Dracons here. That meant that Sarah's pen pal on Sigma Draconis II was just now getting word that what he'd asked for was going to be done. There was, everyone assumed, a celebration of that news going on right now on that alien world; it seemed fitting to have a matching celebration here, and it would be held tonight. One could transmit signals to Sigma Draconis at any time of the day from Canada, but it seemed appropriate to beam a message into space when the stars were actually visible, although the lights from Toronto would drown out the dim sun of the boys' ancestral home.

At the ceremony, a statue of Sarah—as she'd looked in 2009, when the first message was received—would be unveiled. After Expo 67 ended, it would be moved to its permanent home out front of the McLennan Physical Laboratories. Following the unveiling, greetings would be broadcast to Sigma Draconis not just by Amphion and Zethus—who had been sending weekly reports there for ten years now, although none of them would have been received yet—but also by dignitaries from the dozens of countries that had pavilions at the fair.

Traffic was moderate, and after half an hour, the Dracmobile was getting close to their destination. Don had come back to Toronto often over the years to visit his grandchildren, and—more recently, heartbreakingly—to attend the funeral of his son Carl, who had died at the obscenely young age of seventy-two. He took this pilgrimage on each trip, but Gillian and the boys had never been this far north in the city.

As they drove along Park Home Avenue, Don was saddened to see that the library he so fondly remembered was gone. Most libraries were, of course. Don was a bit of a Luddite, and still had a pocket datacom, but Lenore and Gillian had web-accessing brainlink implants.

He drove the van into the cemetery—another anachronism—and parked it as close to Sarah's grave as he could. The boys put their filter masks back on and they all walked the rest of the distance, kicking through fallen leaves as they did so.

Don had brought a virtual bouquet with a cold-fusion battery; the hologram of red roses would last almost forever. His kids, normally boisterous, understood he needed a quiet moment, and gave it to him. Sometimes when he came here, he found himself overwhelmed by memories: scenes from when he and Sarah were dating, events from early in their marriage, moments with Carl and Emily as children, the brouhaha when Sarah had decoded the first message. But this time all that came to mind was the celebration, almost twenty years past, of their sixtieth wedding anniversary. He'd gone down on one knee then—as he had just now to lace the flowers. He still missed Sarah, very single day of his life.

He stood up and just stared for a time t the headstone, and then he read arah's inscription. He turned and conemplated the blank space next to it. His wn planned epitaph—"He was never eft holding a Q"—wasn't quite as nice s hers, but it would do.

After a few moments, he glanced at enore, wondering how she felt knowng he'd end up here, rather than next to er. Lenore, whose freckles had faded ver the years, and now had fine lines n her face, must have read his mind, or she patted his arm and said, "It's kay, hon. Nobody from my generation ets buried, anyway. You paid for it; you night as well use it . . . eventually."

Eventually. In the twenty-second cenury, or maybe the twenty-third, or . . .

The age of miracle and wonder. He hook his head, and turned to face his hildren. Sarah, he supposed, was nothng special to Gillian: just his father's irst wife, a woman who had died years efore she'd been born and none of vhose DNA she shared—not that such rivial concerns would have mattered to arah. Still, society didn't have a name or such a relationship.

There was no special name for what arah was to the boys, either, but they vould not exist without her. Amphion vas staring thoughtfully at the four ames on the headstone—"Sarah Donna Enright Halifax"—and must have been ontemplating the same thing, for he said, "What should I call her?"

Don considered this. "Mom" wasn't appropriate—Lenore was their mother. "Professor Halifax" was too formal. "Mrs. Halifax" was still available; Lenore, like most women of her generation, had kept her birth name. "Sarah" conveyed an intimacy, but wasn't quite right, either. He shrugged. "I don't—"

"Aunt Sarah," said Lenore, who had always called her 'Professor Halifax' in life. "I think you should refer to her as 'Aunt Sarah.'"

Dracons couldn't nod, so Amphion did the slight bow that he'd adopted to convey the same thing. "Thank you for bringing us to see Aunt Sarah," he said; one of his eyes was looking at Don, while the other three faced the headstone.

"She would have loved to have met you," Don said, and he smiled in turn at each of his three children.

"I wish I could have known her," said Zethus.

Gunter tilted his head and said, very softly, "As do I."

"She was a wonderful woman," Don said.

Gillian turned to face Lenore. "You must have known her, too, Mom—you were in the same field. What was she like?"

Lenore looked at Don, then back at their daughter. She sought an appropriate word, and, after a moment, smiling at her husband, she said, "Skytop." ■

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The Crystal Palace of Adamas, Richard M. Wainwright, Family Life Publishing (www.rmwainwrightbooks.com), $19.95, 72 pp. (ISBN: 0-9619566-8-2).

Peter Watts's Rifters series was a well-received piece of work that explored implications of a number of aspects of marine biology. With **Blindsight**, he steps into new territory, though he assures us that despite his lack of advanced degrees in space technology and astronomy, he has had the benefit of excellent advisors. And so it seems, for though there is surely the usual quotient of bafflegab, he's far enough out there to make it hard for most of us to spot.

The tale is set toward the end of this century, some months after thousands of mysterious iron objects screamed into the atmosphere and disintegrated. The immediate conclusion was that aliens had done a quick survey of Earth, but there was no sign of the aliens, until a spacecraft detected a comet sending signals to some other object.

Enter the tale's characters. Sarasti is an honest-to-goodness vampire, resurrected from fossil DNA belonging to extinct predators of ancient humans; he's one very smart cookie, though right angles give him fits (hence the traditional use of crucifixes against demons). Siri had epilepsy cured in childhood by cutting out half his brain. He has prostheses, but he's not really with it; a severe social misfit, his great talent is synthesis, analyzing what people are saying and doing according to informational topography; he's the narrator, and despite his weirdness, Watts makes him a sympathetic fellow for the reader. Add in a linguist whose mind has been split into multiple personalities, a soldier whose brain contains an assortment of specialized modules, and a biologist so wired into his equipment that he needs prostheses to feel his own skin. They're riding *The-*

seus, a ship fueled by antimatter derived from quantum specs beamed from back home. And when their cometary target self-destructs, the ship diverts out into the Oort Cloud, where something really strange is happening around a large gas giant or smallish brown dwarf.

Not that they know that till they emerge from their tanks and shake the cobwebs out of their synapses. And then it isn't long before the aliens—whatever they are—are talking to them, warning them to get out of the area, and showing signs of communicating without really understanding what they are saying. This is where the title comes in. "Blindsight" is something that happens with people who are blind in a particular way. Nerve signals do not go from the eyes to the visual cortex. But they do make it to the midbrain, and if you throw a ball at such a person, they can (sometimes, anyway) put up a hand and catch it. There are equivalent oddnesses associated with other senses, and Watts raises the question of whether there may not be an equivalent for consciousness itself: Is consciousness essential for intelligence? Can a being solve problems, invent, and communicate without being aware of what it is doing?

The answer and its implications are intriguing. They have a good deal to do both with the nature of the aliens and with the unhappy state of affairs back on Earth when the tale ends.

If it ends. There is no hint of a sequel, but there are definite signs of dramatic events that could provide a suitable stage.

Jane Yolen and her son, rock musician Adam Stemple, have been collaborating on "Rock 'n Roll Fairy Tales," beginning with *Pay the Piper* (reviewed here October 2005) (on his own, Stemple did *Singer of Souls*, reviewed here March 2006). Now they bring to the YA market the charming—if a bit on the sweetish side for my tastes—**Troll Bridge**. Set in Minnesota, land of Scandinavian transplants, it supposes that a few mythical monsters, such as trolls, came along with the humans. As is the way in Europe, people made deals to keep the bogeymen off their backs, but it's not just a matter of putting a saucer of cream on the doorstep. Minnesota is dairy country, and for a very long time, the local county fair has featured a dozen dairy princesses whose likenesses are sculpted in butter. After the fair, the butter is set out on an antique stone bridge known as—you guessed it—Troll Bridge. But this year the town has a new mayor who has no patience for old superstitions. The melting butter has to be an environmental hazard, right? So it stays in the fridge.

And when the princesses gather on the bridge for a photo shoot . . . Well, it's a good thing harpist Moira Darr is running late. She gets there just in time to see a wave sweep over the bridge and a giant green humanoid snatch up the other princesses and chow down on the photographer. Quite bravely she leaps onto the troll's back, determined to rescue her friends.

You have princesses, you gotta have princes. So the Griffson brothers, pop musicians, wind up magicked into Trollholm as well. But where the princesses are destined to be brides for the troll's sons—it helps to have the trickster fox, the Fossegrim, on hand to explain things—the princes are dinner, suspended by the heels above bloodstained chopping blocks. Jacob, the youngest, talks one son into swapping places so that Daddy eats his kid. The others—it's up to Jakob and Moira to save everyone, and it helps that among trolls (if not humans) the women are smarter and more interested in the finer things of life (such as music).

I'm going to pass this one on to a certain niece.

The last time I reviewed anything by Howard V. Hendrix (*Standing Wave*, April 1999), I complained about his tendency to weigh his story down with vast wads of bafflegab and infodump and strain for vaguely poetic sound bites. It was bad enough to keep me away from his later books, but I do like to give writers I have dissed another chance. So I read **Spears of God**. And it has the same problems, as well as a tendency to silly mistakes such as saying, on p. 77, that desert temperatures can hit 500 degrees Centigrade during the day (note that I was reading the advance reading copy; with luck, this gaffe will be corrected by the time the book is released). But it also has strengths the earlier book lacked.

The world of the story is similar to that of his early books. But where earlier he had strange indigenes, altered by symbiotic fungus brought to Earth in a meteorite, sing their home mountain (or tepui) into space, the tepui is still on the ground for this tale. That is unfortunate for the indigenes, for a squad of high-tech soldiers invades their caves, massacres almost everyone, and steals a chunk of the meteorite. Four surviving children are discovered when meteorite-hunters Michael Miskulin and Susan Yamada arrive soon after. And not long after that, the reader learns that someone is collecting bits of meteorites from all over the world and hunting for fragments of genetic material that can be used to make super-soldiers or even recombined to recreate the genome of what just might be the creature we were meant to be, able to manipulate space-time and see into parallel universes (such as the one where the tepui launched). At the same time, someone else is encouraging thefts of sacred stones such as the Black Stone of Mecca (which may be a meteorite) and attacks on sacred sites with the aim of bringing on the End Times. The kids quickly display extraordinary powers, plots and schemes develop apace, and the climactic scenes are climactic enough to satisfy everyone.

Spears of God is good, but it would be twice as good and four times as readable if its arteries were not clogged by expository sludge.

Scott Smith's **The Ruins** is billed as a horror thriller and equipped with a quote from Stephen King that calls it "your basic long scream of horror." But the dominant emotion evoked in the reader is neither thrill nor horror but a rising crescendo of pity for the poor schmucks who walk like brain-dead idiots into a trap.

Brain-dead? Well, they're just kids. Two couples, just out of college, ready to move on to grad school and jobs, enjoying a cheap Mexican vacation. Lots of beach, lots of booze. Good times, right? And if the Greek buddies who fall in with them can't speak English, that's okay. All you really need is sign language and a bottle, right? Then there's Mathias, who does speak English. Very helpful fellow, though he's sad. His brother met a girl who was heading off into the jungle to work on an archeological dig, an ancient mine. She left directions on how to join her if the guy chose, and so he did, never to be heard from again.

You know what comes next, right? Our four young beach bums, with one of the Greeks, decide to accompany Mathias in search of his brother. All goes well until the taxi drops them off at the mouth of the jungle trail and the driver tells them this is a bad place. They should let him take them back to the bus station. But no, off they go to find a village of Mayan peasants who seem quite deliberately unhelpful. When they find the side trail they need, it has been hidden by cut branches. And when they reach their goal, it is a hill covered with red-flowered vinery and surrounded by a wide strip of bare ground. There are also Mayans who warn them off, waving guns and bows, and when Amy steps so close to the vine that it wraps a tendril around her ankle, they change their tune. Now they chivvy all five tourists onto the hill.

There are abandoned tents on top of

he hill, but there are no people. No archeologists, no girl, no missing brother. Nor are there birds or bugs. After a bit of exploration, they find the brother at the base of the hill, a body immersed in vinery, the "flesh oddly eaten away," and arrows in his chest. The Mayans, now surrounding the hill, will not let them leave. They have until their food and water run out, or until someone arrives to rescue them, or . . .

Now the reader begins to feel the pity. There were plenty of signs to warn our idiot tourists off, but if they weren't diots—if they were savvy enough to pay attention, or to bring a local guide—there would be no story, or it would be a very different kind of story. As is, Smith has set up a very logical situation: An admittedly horrific life form, with no hint of its origin (except that the ancient mine is there, and miners worked there for an extended period, so the vine can't have been there forever). It grows vigorously, and the local Mayans have taken as their mission the maintenance of a quarantine. They have successfully created the barren strip around the hill (but for some reason they have not applied the same techniques to sterilize the hill itself). And when a visitor touches the vine and is contaminated by its spores, that visitor is not permitted to leave, for fear that the vine will escape its quarantine and lay waste the world.

Smith's skills are enormous. From this point on, the tale is a steepening downward spiral of the loss of hope and sanity and life itself. There is no escape. There cannot be. The pity and sadness build and build and build with impressive inexorability. If there is any horror, it is entirely off the pages, when the cognizant reader wonders how long will it be before someone notices the bull's-eye pattern (hill surrounded by bare ground) in a satellite photo and sends troops or scientists to investigate and inevitably bring samples of the vine back to some government or university lab.

Now *there's* a horror thriller for you! Not as subtle and restrained as *The Ruins*, but definitely one in the classic mold, with the fate of the world at stake.

On second thought, perhaps we should commend Smith for his restraint.

In World War II, air force planes had a tendency to retract their landing gear while landing, resulting in expensive belly flops. The reason was simple: the "retract landing gear" knob was right next to the flaps knob, and they were identical to the touch. The fix was just as simple: add a flap-like doohickey to the flap control and a wheel-like doohickey to the landing gear knob. No more belly flops.

Sound ridiculous? It's a pretty good example of what Kim Vicente, a distinguished human-factors engineering professor, calls Human-tech in **The Human Factor: Revolutionizing the Way People Live with Technology**. Make technology compatible with human beings, and you get fewer technology-related problems. Another example is stovetop design. The standard two-by-two rectangular layout is not obviously connected to the linear control knob arrangement, and a common consequence is melted pots. The obvious solution is to change the rectangular layout into a parallelogram, so that each burner is in line with its control knob. This was figured out in 1959, but good luck finding an example at Sears. Many more examples exist, from medicine (do thirty-hour shifts have anything to do with medical mistakes?) to urinals (Vicente quite likes the flies that mark the Amsterdam airport urinals with aiming points to minimize splashback but neglects the older practice of using a bee [genus name *apis*] for the same purpose). The human factor can come in at several levels (physical, psychological, team, organizational, and political). The problems that concern Vicente can be rooted in the attitude of technology wizards that if the machine works, it doesn't matter whether people can use it easily or safely, or in the attitude of humanists that workloads, management, and politics are irrelevant to safety. In case after case, he makes clear, technologies can be designed either to help people make mistakes, or to help them *not* make mistakes. The latter requires forethought, prototyping, user involvement in the design process, and provision for plenty of feedback. Not to mention, of course, "systems" thinking.

Since I teach a computer science course in systems analysis and design, many of his points are no surprise at all. Yet the points are well worth making, and I plan to make the book available to my students. If they pay attention, it may help them avoid embarrassing mistakes.

That said, Vicente makes a few embarrassing mistakes of his own, as when he says the world's problems include a population that may hit ten billion by 2025 (for some years now, official projections have pegged that as coming *after* 2050) or when he calls a paper written by a legal scholar and published in a law journal a "scientific" paper ("academic" or "scholarly," sure). It's a subtler error to insist that if steering wheels turned the other way (rotate left to turn right), people would constantly be driving their cars into the ditch. This is true only for people who are already used to rotate-right-to-turn-right steering wheels. People who are used to boat tillers would have no such problem at all, and in fact the first cars used tillers to steer.

Eric Brown is a British writer who is too little known in this country. For evidence to support the claim, see **Threshold Shift**, a collection of ten short stories and novelettes, half of them from *Interzone*. One, "The Touch of Angels," is original to the book; it is one of three of Brown's "Kethani" stories. The Kethani are aliens who came to Earth and offered a kind of resurrection. People wear an implant which, when they die, permits them to be brought back to life in a new body. At that point, they are given a choice: return to Earth, or go t other worlds as an emissary of th aliens. The stories are set in the Englis countryside, among ordinary peopl who must face complex decisions: I "Thursday's Child," a separated coupl has a daughter with a fatal disease Should she get the implant? The mother's religious beliefs forbid. The fathe insists. But both parents must sign th permission form. And oh, yes, fake implants that don't work are appearing o the market. In "The Kethani Inheritance," a son must face the prospect o his abusive father returning instead o conveniently vanishing upon his death.

I enjoyed the book. May you also.

Just what we need, a couple of new "Best of the Year" anthologies. Rich Horton has assembled for Prime **Science Fiction: The Best of the Year: 2006 Edition** and **Fantasy: The Best of the Year: 2006 Edition**, both much smaller and more affordable than the massive tomes we have been seeing from Gardner Dozois. They are also more honestly named—not "the best of 2006," with contents all from 2005, but "2006 edition," contents ditto, and the obvious hint of future yearly editions.

Are they really "best"? Horton thought so, of course, and whether you agree or not, the result is certainly a very readable set of stories. The SF book begins with Michael Swanwick's enticing "Triceratops Summer" and carries on with tales by Tom Purdom, James Patrick Kelly, Joe Haldeman, Susan Palwick, Howard Waldrop, Wil McCarthy ("The Policeman's Daughter," from *Analog*), Robert Reed, Alastair Reynolds, and half a dozen more. The fantasy book's nineteen stories include work by Gene Wolfe, Neil Gaiman, Peter S. Beagle, Pat Cadigan, Gregory Feeley, Paul Di Filippo, and other favorites.

The 2006 Worldcon is coming up as I write this, and Guest of Honor Connie Willis is surely laboring over her GOH speech. Sadly, she—like all her predecessors to date and none of her future successors—does not have a copy of *Worldcon Guest of Honor Speeches* from which to draw inspiration or even—ahem!—to crib.

The book reaches all the way back to Frank R. Paul who in 1939 praised fandom's independent streak. In 1941, Heinlein called SF therapeutic and anticipated the remark that prompted Sturgeon's Law. And so on. Most of the speechifiers are dead now, so here you have preserved the words of Doc Smith, Van Vogt, Leiber, Gernsback, Campbell, Sturgeon, Leinster, Simak, and many more. You can also see the change of SF and fandom from a self-congratulatory cult to a more serious-minded literary "school" (not that the cult has entirely vanished from the SF culture).

A very interesting contribution to any shelf of books dealing with the history of the genre.

I keep running into Richard M. Wainwright at craft fairs and the like, where he festoons a booth with his colorfully illustrated books for younger readers and seems to do decent business. I chat with him, look at his wares, and urge him to send me anything suitable for review.

The Crystal Palace of Adamas is SF. It deals with the world of Sagateum, seeking desperately for new worlds with exploitable resources, and explorer Janus, who finds just such a world—except that it is inhabited by a bunch of very nice folks. Do they deserve to be exploited? A good question, and a good example of the sorts of family-friendly themes Wainwright focuses on. His prose is suitable for older children (and for reading to younger ones), and the general tone is very civilized and even inspirational. I don't think his stories are complex or vigorous enough for many or most adult SF fans, but if you are looking for something different for the kids, take a look at his website, www.rmwainwrightbooks.com, for titles, samples, and discounts. ■

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Dear Dr. Schmidt:

"A New Order of Things" was intricate and imaginative. I enjoyed it very much, in spite of a couple of bothersome technical details near the very end (Chapter 44).

In the story, the electromagnetic pulse only fried components that were turned on. I hope somebody corrects me if I'm wrong, but I don't believe that really matters. An EMP kills circuits by inducing destructively high voltages or currents in conductors. A power switch interrupts only one of the millions or billions of conductive lines in modern electronic equipment. Throughout the system, delicate electronics can be destroyed by reverse voltages, breakdown voltages, and excessive currents. The normally miniscule voltages and currents of a powered system should be negligible compared to those generated by a strong EMP. (In some cases they would add; in others they would subtract.)

The other thing that grated was the image of the remains of *Harmony/Victorious* "tumbling about three axes." What happened to conservation of angular momentum?

I recognize that bulkheads occasionally gave way, venting gas and debris. Nevertheless, for an object big enough to lose only a third of its structure to a Nagasaki-size explosion, I consider it unlikely that an individual bulkhead loss would produce enough angular momentum change for a human eye even to notice immediately.

Chuck Gaston
Lancaster, PA

The author replies. . . .

Thanks for your kind words about the novel. I'm glad that the details that troubled you didn't detract from your enjoyment.

Agreed, circuits are EMP-vulnerable on or off. That said, circuits that aren't in use are less vulnerable.

Consider that an operating device already has current flowing, to which the EMP-induced currents are additive. Next, consider a pulse that induces electrical noise short of physically destroying a device. An ON chip may be forced into a dangerous logic state that propagates inappropriate values through its external connections. In that way, the device can affect the larger apparatus of which it is a part—and also whatever that apparatus controls. The same device in an OFF appliance may not cause damage because the transient effects don't propagate.

I might have explained precisely, at the device level, why Centaur spacesuits survived the EMP (or I might have had those suits conveniently and accidentally shielded). In my judgment those details weren't important to the story—but I can appreciate your reaction.

As for the tumbling of the wrecked starship . . . Indeed, gas spurting through broken bulkheads would not seriously affect a habitat-sized vessel. I envisioned other mechanisms in play here. The explosion that blew the stern off the ship was uncontrolled, hence not balanced along any axis, hence causing spin around multiple axes. The first explosion (and the EMP) damaged systems throughout the ship. The initial damage would thus have led to more explosions among shipboard systems.

Dear *Analog*,

"A New Order of Things" was my first experience with the work of Mr. Lerner, and I just had to say it was one of the most delightful little (well, not so little) reads I've enjoyed in quite a while. It eagerly kept me waiting for the next installment, the mark of a great serial. Looking forward to more from this writer!

Ted Dunning
California

Dear Dr. Schmidt,

Kudos to Edward M. Lerner! "A New Order of Things" is a smashing success, in my not-so-humble opinion.

As an aspiring writer, I have a profound respect for his incontrovertible mastery of the craft, particularly in sight of his somewhat risky use of the tentacled and nictitated aliens. But he pulls off a convincing characterization of The Hunters and The Herd by striking a delicate balance between anthropomorphizing and preserving their alien natures. I was particularly impressed with the martial, indeed "Spartan" syntax of Hunter dialogue, with its no-nonsense, go-for-the-throat directness, and the more circumlocutory, ambling ruminations of the Herd.

As an admitted Tom Clancy fan and techno/jarhead, when the Marine Spec-Ops blasted the hole into the side of *Victorious* (*Harmony*) and executed the hostage rescue insertion, I jumped into the air in celebration. I was that deeply engrossed . . .

On a final note, Edward Lerner has provided the best blend of speculative science fiction and hard physics with and engaging plot that I have read this year. Few others bring the immediacy and grit like he has in "New Order," and I look forward to reading more of his work. I could see "New Order" expanded and made into a movie capable of buoying up the apparently moribund S/F film fare; especially when the Wachowski brothers still have physical lines plugged into brain stems and copper phone lines facilitating consciousness downloads into The Matrix. Lerner's deft handling of split-paradigm conscious interfacing and wireless mindnetting is a breath of fresh air.

It would be interesting, as a writer, to learn how long it took My Current Favorite S/F Writer to complete "New Order."

Thanks to Mr. Lerner for the great entertainment, and to *Analog* for publishing it.

William Steed Kelley
Huntsville, TX

Hi Stanley,

I always read your column and very much enjoy your observations and comments.

Some years ago my wife and I were traveling across New Mexico and encountered a sign:

"Warning. Hitchhikers may be escaping prisoners."

My first thought of course was that we should assist the hitchhikers lest they be captured by the prisoners.

Then I wondered why they did not say:

"Warning: Hitchhikers may be escaped prisoners."

Then I realized that guys that lost the prisoners didn't want anyone to think they had successfully escaped. Instead they wanted people to think that the prisoners had not yet *fully* escap*ed* and were merely in the act of escap*ing*.

I have imagined a meeting where this was discussed by the law enforcement people who decided that ambiguity was politically better than the stark truth.

Not quite the same as your point regarding journalistic ethics, but perhaps similar to some extent?

Howard
Tempe, AZ

Dear Stan,

Regarding your editorial "Science, Journalism and Responsibility" (Sept. 2006), I respectfully submit that you've missed the larger point. Maybe all these years of writing wonderful editorials for a magazine with a long lead-time has blinded you to the inherent realities of newspapers and their daily deadlines? They don't have a lot of incentive to get things perfect. It's the nature of the beast that "subtle errors" will appear in print. Your exhortation to scientists to spend the time it takes with journalists to make sure they get it right won't do any good, because the journalists making the errors generally don't have enough time to listen. Besides, "a headline that suggests that the whole field is inherently fraudulent" could just as well be sending the exact message that someone has intended.

Thus the misleading stem cell clone research headline presents a great opportunity to make a much more important point. There's a fair chance that regular readers of the news had already seen reports about the original results and the investigative panel. Reading the headline within the context of the previous news makes it far less likely to be misinterpreted. Your point that writers need to be more careful about misinterpretation by uninformed readers attacks the problem from the wrong end. What our modern education system lacks is in-depth training for how to be an informed reader (e.g. how to read between the lines). Many of us have been horrified to read a story about which we have in-depth knowledge when we have discovered how many errors are in it. Instead of losing faith in the source, we need to learn how to recognize potential errors in what we read. More importantly, we need to be able to assemble a "big picture" from a story that is unaffected by errors in details. The "why" behind a news story is often much more informative than the "what." It may not be written down in front of your nose, but it is there for you to read nonetheless. When John Q. Public learns to read the news within the context of the past flow of events, the politics, the economics, the geography, the culture, etc., and asks questions like "why?" and "why now?" he will make more effective personal decisions and our whole society will make much more effective collective decisions too. How can *Analog* readers help to speed this process? You can help by teaching your kids what they won't get taught in school, by lobbying school boards to add classes like logic and current events to their curriculum, by steering the course of water cooler conversations to include "new" aspects of the same old topics or by simply asking yourself more questions when you read the news.

Rusty Carr
Mount Airy, MD

P.S. *Analog* needs to do a much better job of printing editorials I disagree with. Come on, man! Twenty-five-plus years and this is the first thing I've disagreed with enough to write a letter. Thank you! ■

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Look over all your copies of *Analog* dated 2006, or refer to the index on the following pages. Pick your *three* favorites in each of the following categories: novella, novelette, short story, science fact article, and cover. If you're not sure about a piece's category, you'll find it listed both in the Table of Contents for the issue in which it appeared, and in the Index. In the event of a disagreement between the Table of Contents and the Index, the Index should be considered correct. List your choices in order of preference (your favorite in each category is #1) on the ballot below, and either mail it in or send it by e-mail. You can also vote at our website, **www.analogsf.com**. The ballot is intended to make it easier for you to vote, but if you don't want to cut it out, feel free to copy it.

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UPCOMING EVENTS Anthony Lewis

24–26 November 2006

LOSCON 33 (Los Angeles area SF conference) at Los Angeles Airport Marriott, Los Angeles, CA. Theme: Exploring the Golden Ages of Science Fiction. Guest of Honor: William Tenn; Fan Guest of Honor: Fred Patten. Registration: $35. Info: www.loscon.org; info@loscon.org; Loscon 33, c/o Los Angeles Science Fantasy Society, 11513 Burbank Blvd., North Hollywood, CA 91601

1–3 December 2006

SMOFCON 24 (Convention runners conference) at Hotel Phillips, Kansas City, MO. Registration: $60 until 31 October 2006, $70 at the door; supporting membership $25. Info: http://www.midamericon.org/smofcon/index.htm; SMOFCon 24, PO Box 414175, Kansas City, MO 64141-4175.

12–14 January 2007

ARISIA '07 (Boston area speculative fiction conference) at Hyatt Regency, Cambridge, MA. Writer Guest of Honor: Esther Friesner; Artist Guest of Honor: Hilary Scott. Registration: $35 until 15 December 2006; $40 at the door. Info: www.arisia.org; info@arisia.org; Bldg. 600, PMB 322, 1 Kendall Sq., Cambridge MA 02139.

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30 August–3 September 2007

NIPPON 2007 (65th World Science Fiction Convention) at Pacifico Yokohama, Yokohama, Japan. Guests of Honor: Sakyo Komatsu and David Brin. Artist Guests of Honor: Yoshitaka Amano and Michael Whelan; Fan Guest of Honor: Takumi Shibano. Registration: USD180/JPY20,000 until 30 June 2006, for thereafter. This is the SF universe's annual get-together. Professionals and readers from all over the world will be in attendance. Talks, panels, films, fancy dress competition—the works. Nominate and vote for the Hugos. This is only the third time Worldcon will be held in a non-English speaking country and the first time in Asia. Info: www.nippon2007.org; info@nippon2007.org; Nippon 2007/JASFIC, 4-20-5-604, Mure, Mitaka, Tokyo 181-0002. North American agent: Peggy Rae Sapienza, Nippon 2007, PO Box 314, Annapolis Junction, MD 20701, USA. UK agent: Andrew A. Adams, 23 Ivydene Road, Reading RG30 1HT, England, U.K. European agent: Vincent Docherty, Koninginnegracht 75a, 2514A Den Haag, Netherlands. Australian agent: Craig Macbride, Box 274, World Trade Centre, Victoria, 8005 Australia.

Attending a convention? When calling conventions for information, do not call collect and do not call too late in the evening. It is best to include a S.A.S.E. when requesting information; include an International Reply Coupon if the convention is in a different country.

Running a convention? If your convention has a telephone number, fax number, e-mail address, or web page URL, please let us know so that we can publish this information. We must have your information in hand SIX months before the date of your convention. ■

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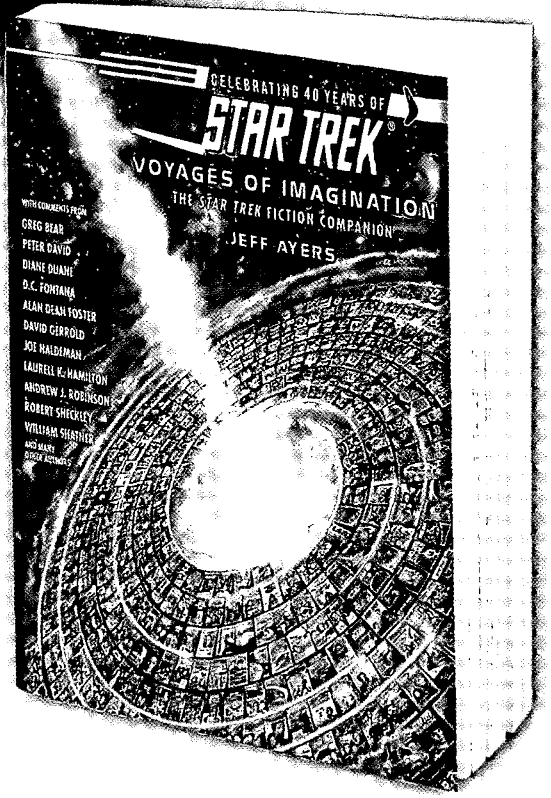
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